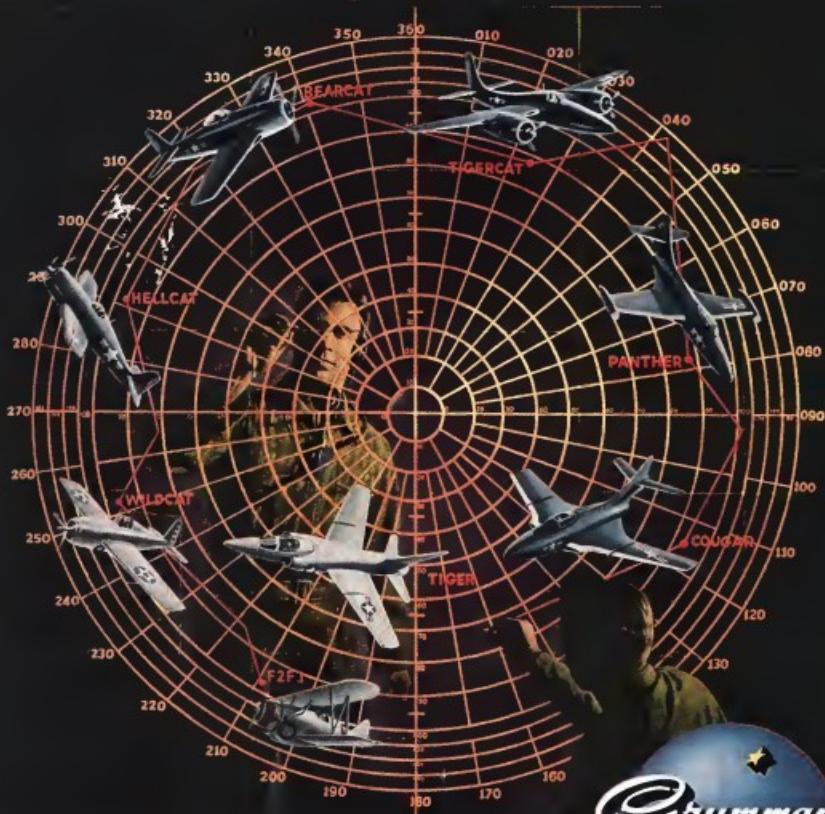


AVIATION WEEK

A McGRAW-HILL PUBLICATION

DEC. 27, 1954

50 CENTS



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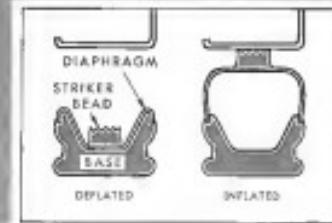


SUNDSTRAND AVIATION

Division of Sundstrand Aircraft Tool Company, ROCKFORD, ILLINOIS • Western District Office: Hawthorne, California

CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER



Prevents blowouts 8 miles above ground

BUBBLE type capsules on fast military planes like North America's Super Sabre had to be safely pressurized at altitudes of 8 miles or higher. Ordinary inflatable seals between the bubble and capsule would often blow out from the effect of low pressure on the outside, losing pressure on the inside.

B. F. Goodrich engineers were called in to the problem. A really effective seal, they believed, should operate with low pressure and stretch very little or not at all. Less stretch would mean less strain. They worked out a seal with a U-shaped solid rubber base. A rubber-

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is eliminated. The new seal withstands a pressure of 1000 psi at 8 miles altitude. It is also more durable than ordinary seals made with less pressure than ordinary seals need at older temperatures. There are other advantages. It means wear and damage better than ordinary seals let in complex curves better. It seals and stretches faster. Sliding wear and scuffing

are minimized.

The new B. F. Goodrich seal is now in use on more than a dozen models of planes, including latest jet fighters and bombers.

Other B. F. Goodrich products for aviation include: tire, wheels and brakes; De-Ice, heated rubber; Pressure Sealing Zippers; Perforated, Reversible, etc.

B.F.Goodrich
FIRST IN RUBBER

NEWS DIGEST

Domestic

Czech investigators from Civil Aviation Board just back, collaborated with five experts from Italy in preliminary hearings as an Italian military DC-3 that plunged into Jamaica Bay on Dec. 15, killing all 17 persons aboard. The aircraft was en route from New York to Amsterdam. Avianex said the 32 percent attempt to land at night was the cause.

Emphasis of engineers at the high-bomb U.S. armament depot was pointed up again last week by Defense Secretary Charles E. Wilson, who announced more than 480,000 men will be cut from the industry while USAF will grow, he said. The Air Force will have 1,000 aircraft at present \$61,000 to \$70,000 to arm jobs and \$75,000 to the missile work.

Double speed record for Miami-New York flight was set Dec. 19 by a National Airlines DC-7 liner to cover 2 hr. 25.7 min. Block to block 2 hr. 31 min. The transport maintained an average speed of 490 mph and left a maximum of 589 mph, with a minimum of "slight" turbulence.

First Navy T-38 has been delivered to the United Aircraft Corp. at Wichita, Kan., 173 miles from its base, powered by a 274-hp Continental engine, also in use at present by USAF, Canada, Chile, Colombia, El Salvador and Japan.

Lockheed Aircraft Corp. has received a new Navy order for 45 F7U-2N fighters, extending production of the two-seat fighter plane into late 1956.

Fairchild Engine & Airplane Corp. has added an 1,000th C-123 cargo transport (all production total) at Hagerstown, Md., and delivered the 100th aircraft, two-seat Viking liaison to the Air Force.

Wright Aeronautical Division of Curtiss-Wright Corp. has received National Safety Council's award of honor for a record 4,497,561 hours without a disabling injury.

Last T-38D mission produced by North American Aviation's Downey, Calif., plant has been delivered to the Navy.



B-45 Testbed Aids J40 Jet Development

Increasing the altitude at which the Wright-Jet-powered B-45 testbed can be lighted in the air is a development program involving the North American B-45. Testbed flights tested above with the prototype under its fuselage. The J40 flight program is being carried out at Hunter Field, Calif., with Texas Aircraft Corp. handling data reduction and analysis plus weapons supply and other services.

Member nations of the independent Military Air Transport Agency have been contacted by Gov. Antoninio Adm. Ambassador Fred R. Lee for more than 15 months of worldwide operations without a single fatal accident.

The installation of the Wh-344 London mechanized aircraft deck-loading device (AVIATION Week Sept. 27, p. 7) has been put into service at New York's Idlewild International Airport. Approximate cost of the device plus installation \$30,000.

Air Conditioning Committee's technical division has failed to agree on a proposal to limit the number of transistors to over 1,000 ft., and the problem has been referred to ACC members. Radio and television representatives have pointed out that space is not solely an aeronautical resource.

First production Air Transport new age nuclear airplane (AVIATION Week, Feb. 5, p. 18), started on its initial flight after a 25-ft. run and climbed to an excess of 1,500 ft per min at 60% power, reports builder Central Laminar Aircraft, Yakima, Wash.

Financial

International Air Transport Assn. reports scheduled airline traffic ton-miles per month in December during the first nine months of 1954 totalled \$130,567,000, an increase of 15.3% over the \$115,045,820 for the same period last year.

International

Trans-Canada Air Lines' Super Constellation cockpit and fuselage, Dec. 17, taxied from its destination on a flight from Tainan, Pao, to Taiwan. None of the 13 persons aboard was killed.

Shortland Industry transports are being designed by Paul Dubon and Sadiq, who will be assisted by a special group representing all French civilians. Both transports probably will be powered by two Pratt & Whitney T-34s.

Boeing's long-range production of turbo-propelled bombers and fighters has forced the government to consider reducing its war-time Ministry of Production Aircraft, according to press reports. Prime Minister Sir Winston Churchill says delay in deliveries to the Royal Air Force and Royal Navy are being examined.

J. P. E. Verhoen, 56, member of Canada's famous Air Transport Assn. Board, pioneer pilot who helped open northern air routes and won a DFC Medal, trophy, died Dec. 17 at Ottawa.

Sabena Belgian Airlines is taking the corporate name of Sabena Belgian World Airlines.

Swedish turboprop producer, Svenska Flygplan AB of Trollhättan, is beginning a 25-model expansion program based primarily on a new variant designed with the Royal Swedish Air Force R-50F is reported to be trying to supply an entire world to Sweden.

FORGING TECHNICIANS—Yes, that is the compliment paid us by those acquainted with our services. In back of each design is a thorough understanding of engineering and metallurgical needs before production begins . . . assuring forgings of maximum physical properties and uniform quality.

THE LANDING GEAR FORGING illustrated, nearly five feet long, is an important component for a modern military fighter . . . another example of Wyman-Gordon's technical contribution to aircraft.

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The Aviation Week

December 27, 1954

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precision resolvers
BAE 11,16,20

400th servo motors
BAE 11,15,16

brushless induction
potentiometers
BAE 15

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SEATTLE, TACOMA, SEATL

The Aviation Week

December 27, 1954

as others see it . . .

A user tells how AETCO SERVICE helped him



WALTER T. JOHNSON
Manager
AIRCRAFT
PRODUCTS CO.

"Aircraft Products Company has been a customer and supplier of AETCO's in the past. We consider those of our own interests, for experimental and qualification testing of Alarisco Hydraulics Components."

"At the same time, one of our projected AIR Standard valves are being developed and manufactured by AETCO. This valve is to be used in our own laboratory. AETCO was engaged to perform the qualification testing in order to obtain a better understanding of its performance.

"Results of the testing performed were completely satisfactory. The results were documented in accordance with specified standards. The customer of the reported results has had previous, by letter, full cooperation in this regard."

"AETCO was chosen by our engineers. The basic importance rests on the basis of getting test results considered satisfactorily by them."

"We feel that the same importance should be given to the factor of reliability in aircraft equipment testing as is given to dependability in the use of the product in the strength. The work however has been excellent."

"AETCO has been a factor in our selection of firms to carry on this work."

"The adequacy of their equipment and their long standing experience in the aircraft Testing Field, we feel, are other qualifying factors."

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drives 1000 cfm.
40 HP and modulated
as model required.
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AIRCRAFT
EQUIPMENT
TESTING
COMPANY
GRANADA PARK

Washington Roundup

Philadelphia for Airshow?

Philadelphia is a dark horse entry in the 1955 National Airshow competition.

Loren R. Howard, city's director of aviation, told *Aviation Week*: Philadelphia is drafting a formal committee with an outline of its program and pledge of \$100,000 from the chamber of commerce to help finance the show. Howard and chamber officials have met with other city leaders, but the Franklin, general manager of the show, to discuss the project.

Philadelphia has become a strong contender for the 1955 exhibit. Franklin said because the city is ideally located in the center of the East Coast's most concentrated population area with good road facilities north and New York south at least as far as Washington and west to Pittsburgh.

Howard uses Philadelphia's International Airport, where a new \$3-million terminal was opened a year ago, has more hangar space available for state exhibits than can reasonably be used in the show. The field has four large hangars, two occupied by Pan Am Helicopters Corp., and one each by Trans World Airlines and the Air National Guard.

Howard may be a candidate at least two and probably three of the buildings can be made available. In addition, the airport's real estate building can be used.

Only standable block to achieve plain measure is the Post Office, where a top-level division is expected to be let and Johnson, Postmaster, is first the Secretary of the three armed forces will discuss the question of Defense Department support for the show in meetings next month. Navy is known to oppose construction of the show. Air Force strongly favors the exhibition.

Support for Feeders

Changes by local service offices for permanent continuation has gained support from CAB members for whom the other four CAB members still oppose the move.

Latest statements of position came in a series of letters from Adams and GMG Chairman John G. Morrissey, chairman of the Senate Interstate and Foreign Commerce Committee, which will review legislation aimed at permanent certification.

Sen. George Smathers, the lead congressional sponsor of the bill, told *Aviation Week* that the air passenger bill reflected the smaller communities by its local service carriers as is consistent in the transportation industries.

"Passenger certification assigned by Adams would have a dilemma of choice between points with more exclusive points that could be adjusted as traffic would be developed thus causing an element of flexibility in the certification," he said.

Procurement Red Tape

Harried military procurement officials sometimes surprised by cost overruns and cutbacks have justified finding that too few people make too many things have to be considered in making a purchase.

It is not a question of finding the best product or the lowest price, despite the political fixation that we are behind so some of the same people who set up the hurtles for the industry buyer.

In addition to being forced to low bid products at the lowest possible cost, exerting the workload here with proper consideration as indicated, disposal time price the buyer has often ramifications.

He is advised to buy American, buy Canadian and buy offshore. He must police his accounts, cancel deliveries, and assume responsibility. He must develop multiple sources, save critical materials, obtain waivers, encourage foreign purchases, and accept responsibility for obtaining and small sources. In addition, there is considerable preoccupation from the General Services Administration and the federal power industry.

The mobile war acreage defined last summer in Sen. Homer Ferguson's map, March 1, will not be set at the next Congress. Said he: "Congress has got to be the place where it never repeats a law. It just adds another law on top."

Missile Security Crumbles

Washington observers are wondering how much better Department of Defense bids are going to divide themselves on missile contracts. Top-level Pentagon officials believe adequate plans are being maintained on latest missile developments enough because no public releases are being made from its public affairs paper mill.

However, Bob's Board of Inquiry panel has issued an edict at Boeing's Seattle Airport and the Niagara Falls, N.Y., congressional station adjoining a public highway that they should be located to set the table.

Northrop's South has been picked as a suitable site at Hawthorne, Calif., and the panel agreed. Now Adm. J. E. Wilts, chief of the Guided Missiles Division of the Office of Chief of Naval Operations, recently showed plans of means of the Comptroller Test in action about three months ago at an unclassified meeting of the Aviation Ordinance Asia, but Northrop still has the contractor firm holding Ternit perhaps.

No public information is available on the Comptroller Test, intercontinental ballistic missile, most sensitive missile project in the Pentagon arsenal, so little goes without news except and such newspaper in the San Diego area.

Air Logistics Bottleneck

Although top USAP been forced out of route, for the second air logistics conference in Washington Jan. 17, the last battle to get USAF supply of the general and intercontinental air freight within the air force.

Stans has an overall assignment not to touch these logistical bleeding from the USAF's strengths in carrying certain populations of World War II era bombers and modern supply planes. Army Air Forces' commandant USAF's commandant of the Air Materiel Agency will be watching the fiscal 1956 budget closely to see if air transport will really grow more capable when it comes—in the production.

Now is that aerial logistics could considerably affect USAP and improve submitted return on their overall investment by reducing procurement requirements for expensive equipment such as jet engines and aircraft systems.

—Washington staff



Mission Accomplished

This versatile, light personnel transport and instrument-trainer is helping the United States Armed Forces to win the battle against time waste. Flying at speeds up to 300 miles per hour, this rugged, dependable Beechcraft is cutting military travel time by as much as 75 per cent. At the U.S. Army's efficient transport, it has accomplished many important missions both in the United States and abroad.

For economy of purchase, operation, and maintenance, no other airplane in its class can equal the Beechcraft L-34A. This comparison alone has won numerous awards for Beechcraft against all competitors.

Beechcrafts are serving all branches of our Armed Forces, and many government agencies have found Beechcrafts their answer to time and economy problems.

The Beechcraft L-34A is the largest fast-moving airplane flown by the U.S. Army General Forces. A civilian version, the famous Beechcraft Model 99, is a popular member of the 40 Fleet of American Airlines.



Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Beech Model 120 • Beech T-34 • Beech 123 • Beech C-45 • Model 99 Beechcraft • Model 100 Beechcraft • Super 10 Travelair Travelair

WHO'S WHERE

In the Front Office

John A. Meegan, *assistant Ass. Material Command* staff controller for procurement and production (4951 53), a new vice president of Glass Fibers, Inc., and general manager of its Wyoming Division, Rockland, Calif.

Ralph W. Mass, former design engineer at Lockheed Aircraft Corp. and now vice president sales for Herold Sales, Inc., has taken on additional duties as sales manager of Model Engineering & Supply Co., Glendale, Calif.

Alfred E. Kassoff has been appointed a vice president of Paul Ellenson Co.'s Miles Metallic Corp., Elms Core, N. Y., also will retain his position as vice president of Aircraft Frame Metals, Inc.

Oren J. Stark has become a vice president of M. G. Industries, Inc., New York, joint clients manufacturer.

Robert J. Wilson, vice president, procurement and properties for Capital Airlines, has been elected a director of New York's Central Transport, Inc., and East Side Transportation Co., George E. Williams having returned to the firm after USAAIR and its subsidiary will take over its former position of manager, vice president traffic and sales.

Changes

G. E. Kirk is now assistant to United Air Lines vice president-engineering and maintenance.

Edward M. Bannoff has moved up to United Airlines Corp. as senior technical director of the Standardized Division, Woodlawn Lakes, Conn., also promoted John E. Bremner to chief test engineer of 1971.

Howard L. May has been appointed general purchasing agent for General Dynamics Corp., San Diego. Other changes: W. G. Evans, purchasing agent, Edward Fellow, Jr., purchasing supervisor.

Dr. George L. Heller has become manager of the laboratories department of General Electric Co.'s Electronics Division, Syracuse, N. Y.

John G. Donatti has been named chief engineer of Sematech Associates, Inc., Troy, Mich., M. T.

Honors and Elections

Gonzalo Orellana, president of Aviones civiles, was president Hugo Gobbi and other presidents of the Pan American Caribbean League, awarded the award of Commander in the Order of Civil de Honor, highest decoration of the government of Colombia.

William T. Fipes, president of Fipes Aircraft Corp., was honored for his contributions to the aviation industry at a recent dinner given by the New Club of Europe, Vienna, Austria.

Rodney F. Morris, Hughes Aircraft Co. engineer now on loan to the Defense Department, has been named the "outstanding young electrical engineer of 1959" by the Kansas City chapter of engineering honor society.

INDUSTRY OBSERVER

► Convair T-102A flew past Mach 1 in level flight above 30,000 ft during early stages of its flight testing at Edwards AFB last week. Convair test pilot Dick Johnson reported on "frightening" maneuvering and good control characteristics all the way through the transonic range. T-102A has a lower gross weight and more power than the prototype model. It is powered by a new version of the P&W J57 turbjet developing 15,500 lb thrust with afterburner.

► USAF expects to have the Pratt & Whitney TST turbojet flying experimentally in about two years and operationally in short five years. TST is aimed at producing about 15,000 shp and is scheduled to power the Douglas C-132 logistics carrier now being developed at Santa Monica, Calif.

► Lockheed's F-104 day superiority fighter is being considered by Canada for limited production in Canada for the Royal Canadian Air Force. Presently, Canada had been interested in production of the North American F-104 fighter Seller.

► Navy's Sidewinder missile uses a solid-state installation of three pods at the aircraft wingtip. One pod is slung below, one above and one outboard of the tip, giving a continuous appearance from the front. The anti-aircraft missile system is being developed by a group of manufacturers, excluding the Philco Corp.

► Avco Canada had eliminated many of the bugs that were retarding introduction of its twin-jet CF 160 into RCAF operational service, including test-cycling problems, hydraulic system troubles, communications and other problems. RCAF will set the CF-160 into widespread operational use during 1959. Avco feels these will in considerable performance growth potential in the CF-400 design.

► Canadian is building a full-scale mockup of the maritime reconnaissance version of the British Harrier and expects to have its first flying prototype ready for rollout by the end of 1966 or early in 1967. The British version will be powered by Wright's Turbo Compound engines.

► Long sought goal of direct amplification of light via silicon junction tubes has been demonstrated by General Electric Co. scientists using new transparent film-type photodiodes (Aviation Week Oct. 11, p. 61). Possible applications of the new technique include night time aerial reconnaissance of enemy movements using ultra-violet (black) light, display of solar and blind landing information on cockpit windshield, and brighter cockpit color display.

► Use of aluminum-coated plastic is expected to grow in aircraft and missile applications in U.S. British has been using material in rocket nozzles because of its heat resistance and insulation qualities. Material also bonds readily with nozzle. Experiments show that combination of fibrous glass and aluminum is even better insulating medium than asbestos alone.

► Convair is producing a new version of the STT anti-submarine warfare plane designated the STT-3. Among new features included in the STT-3 is a rotary type bomb bay.

► French government has awarded a \$780,000 development contract to Beguin for its new Model 940 design featuring a high-mounted wing and to be powered by two 400 hp. Turbomeca turbines. The Model 940 is designed to take off and land in 150 ft. and will have a special device controllable by the pilot to direct the jet exhausts downward during low flying speeds—probably similar to the arrangement now being flight tested by Bell Aircraft Corp. in its vertical-takeoff and landing assault. French government plan is to award to two prototypes Model 940s of design looks promising.

► Combat speeds of military aircraft will increase to Mach 5 and operate at altitudes of 180,000 ft. during the next 10 to 20 years, according to Col. W. A. Hartman, chief of the Tactical Weapons System Division of Air Research and Development Command.

Aviation Sales Outlook: \$8 Billion in '55

- AIA expects net profits to equal 1954, as deliveries and employment remain stable for fourth straight year.
- Forecast for new year predicts more transports and bombers will be built, missile production will increase.

By G. J. McAllister

Aircraft industry sales of \$7,981 billion are projected for 1955, a slight decline from the \$8.2 billion in sales for 1954, Aircraft Industries Association predicts.

However, manufacturers can expect profits to remain above the 1954 level and to be approximately the same as in 1954 because of the expansion of the export market.

Steady Output—This will be the fourth straight year that aircraft sales have reached or exceeded \$8 billion, in unusually stable level of operations.

The barometer of the state of the industry—sales, pounds of aircraft and employment—will remain steady, although new products will continue to show a healthy response.

■ **Hopes**—Aircraft principals in the business and transport categories will be built.

■ **Guided missiles** are taking an increasing amount of the industry's production effort. At least 36 different models are in production or service test stage.

■ **Research and development** continues at a relatively high level.

■ **1955 Outlook**—The association also forecasts this forecast for next year:

■ Employment will continue at a high level, with a 1955 average of 755,000 workers. Shortage of engineers and technicians will not decrease.

For aircraft produced in 1954 sales \$6,100. Average employment from January through September was 701,000, making the aircraft industry the nation's leading employer. The 1954 payroll was \$3.5 billion, legal as the U.S., and average annual earnings were \$4,614.

■ **Combat capability** will be appreciably increased with the delivery of new high-performance models, and in the mid of 1955 USAF will be 95% modernized and the Navy 40%.

At the end of 1954, virtually all combat aircraft in production were planned and production had started on seven supersonic fighters and one

supersonic bomber. Fighters are North American's F-102, McDonnell's F-101, Convair's F-106, Lockheed's F-104, Republic's F-86D, Douglas' F-4D and Chance-Vought's F8U. Bombers in Convair's C-54.

■ **Revolutionary advances** in armament since have imposed an increasing need for attacking aircraft bombers and test equipment. This will create an investment requirement for the type equipment during 1955 although production plans virtually have been completed.

■ **Civil aircraft** installations at year-end had stalled earlier for 175 large commercial planes and are expected to continue this leadership in the world civil aircraft market. During 1954, U.S. manufacturer delivered 327 planes, of which 195 were passenger planes. Large aircraft were twice as many as planes in previous years.

■ **Unit production** of civilian aircraft in 1955 will be approximately the same as last year. Sales for 1954 are estimated at \$60 million, an increase from 1953 totals of \$54.3 million, and an increase in aircraft weight from the 1953 total of 16.8 million lb to 17.5 million lb in 1954.

This is the result of new non-passenger aircraft being offered in quantity for the first time in 1954.

■ **Producers** of helicopters for commercial use are expected to increase in 1955,

total

sales \$40 million. Average employment from January through September was 301,000, making the aircraft industry the nation's leading employer.

The 1954 payroll was \$3.5 billion, legal as the U.S., and average annual earnings were \$4,614.

■ **Combat capability** will be appreciably increased with the delivery of new high-performance models, and in the mid of 1955 USAF will be 95% modernized and the Navy 40%.

At the end of 1954, virtually all combat aircraft in production were planned and production had started on seven supersonic fighters and one

Military Production

Production of military aircraft since the start of the Korean war in June 1950 is estimated by AIA at \$5,500 to \$7,000 million.

Estimates by year:

1950—More than 3,000*
1951—More than 5,000
1952—9,000
1953—11,000
1954—10,000 to 18,000
1955—More than 20,000**

Following steady increases made in 1954

■ **Turbojet** F-102A sales volume during 1954 of the 12 largest aerospace manufacturers was about 35.3 billion, highest since World War II. Sales by these enterprises in 1955 are expected to approximate the 1954 record.

The end of 1954 marked the transition from the buildup to the research and modernization phase of the nation's rearmament program. Heavy production of airborne weight in 1954 was about the same as in 1953—180 million lb.

AIA predicts production of airborne weight for 1955 will be about 10.6 billion lb. Military figures represent about 95% of the total military effort.

Aerospace industry during 1954 was able to place no significant emphasis on improving manufacturing techniques and cost-reduction efforts.

Principle example of improving the quality and reliability of products is in jet engines where substantial advances in requirements become possible through increases of time between overhauls.

NAA Profit Exceeds \$22 Million

Record postwar profit of \$22,179,716 was reported by North American Aviation Inc. for its fiscal year ended Sept. 30, 1954. The NAA report is a bellwether on the effect of expansion of excess profits based on 1950 profits.

North American's record \$22,179,716 is in sharp contrast during the year, when \$2,256,000 in profit, compared with \$3,747,800 at the start, was made.

However, the corporation plans to invest \$5.5 million in additional facilities during 1955 to meet increased de-

velopment and production loads. Among the new facilities planned is a precision machine shop, nuclear development facility, new metal offices and addition to the separate research. Total of \$6 million was spent for new facilities in 1954.

Employment increased to a record total of 54,993 at the end of fiscal 1954. ■ **Expanding**—Intensified—the North American annual report gives a clear picture of the mounting character of the firm's expanding activities that have changed it from primarily an airborne manufacturer to an industrial giant with extensive interests in electronics, rocket propulsion, nuclear energy and guided missiles.

Aerospace still accounts for the major portion of its total sales, of which 55% are in aircrafts of the jet and government.

North America's defense production is distributed as follows among five divisions:

■ **Los Angeles** produced F-86F fighters, F-86D all-weather interceptors and F-101 Super Sabre day fighters for USAF; will produce two new versions of the F-100 series in 1955, including a fighter-bomber configuration and an all-weather interceptor.

■ **Calif.**—Produced FJ-2 and FJ-3 intermediate-range fighters, AJ-2 and AJ-2B nuclear-bomb carriers, and F-86F and F-86H fighters/bombers for USAF. During 1955, F-100 production will begin here, and the Navy's T-33 jet aircraft program will be transferred from Denver.

■ **Huntington**, the first major design project of this division, will go into production during 1955 for Navy.

■ **Dallas** produced T-33 trainers for USAF and Navy and housed development facilities for atomic nuclear and electronic work.

■ **Pittsburgh**—Completed T-6G modification program and began construction programs on F-86 fighters and F-86D fighter-bombers.

In addition to the two new versions of the F-86 series, North American also expects to move F-86 production for USAF and is pushing the sale of a three-place trainer version of the F-86 to both USAF and Navy.

Guided missile and guidance control equipment program at the Dallas Division continued to expand during 1954, and a number of these projects moved from development to mass-producing phase.

NAA expanded new contracts received for development of both missile and aircraft guidance systems, a plan of the corporation's space exploration activities that has drawn civilian space avionics manufacturers already established in the field.

■ **Rocket Components**—North American's venture into rocket propulsion is be-

Gains in 1954

	1954	1955
Total sales	\$62,179,716	\$82,775,381
Net	\$6,374,541	\$6,307,518
Earnings per share	\$4.46	\$3.72
Dividends	\$174,000,000	\$19,000,000

ginning to pay off with the accept of contracts for large rocket motors for missiles to be manufactured by another company.

Presently, the same North American is a joint part of the population in Canada. Convair's Atlas missile unit, which is the sole important segment for the large rocket power plant, will be developed at Washington under the Air Force Act.

During the past year, the principal problem faced in development of the system.

■ **Shift** in military logistics greater to shifts in a permanent method of transportation for certain critical material than as an emergency step-up.

■ Development of 180 mph transports capable of carrying 100,000 lbs. planned over 3,000 sq miles.

■ Development of high-priority transit programs that will make the long-haul transport losses negligible would provide.

■ Integration of the capacity of the civil airlines into a permanent peace-time military aerial logistic system.

■ Development of the aerial logistics system during peacetime so that it is as long and operational when required to support combat in strategic warfare.

Air Logistics

- Experts cite combat need for aerial supply system.
- Military, civil spokesmen outline major problems.

By Robert E. Hause

Acute need for a global aerial logistic system is a major concern of USAF. Acute need for mobile corps was outlined by top spokesman for the military, Defense Secretary Robert S. McNamara, at Washington conference of the Air Force Act.

Among the principal problems cited in development of the system:

■ Shift in military logistics greater to shifts in a permanent method of transportation for certain critical material than as an emergency step-up.

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■ Development of high-priority transit programs that will make the long-haul transport losses negligible would provide.

■ Integration of the capacity of the civil airlines into a permanent peace-time military aerial logistic system.

■ Development of the aerial logistics system during peacetime so that it is as long and operational when required to support combat in strategic warfare.

Talbott Reports

USAF will take another major step in establishing an aerial logistic system next spring with the acquisition of half of all aircraft engines required by the services, Gen. USAF Senator Harold Talbott told the conference.

Talbott said the aircraft will be converted aircraft operated by civilian crews to support military units with the project (Aviation Week Aug. 18, 1954).

■ **Oversized Cycles**—This project provides a good example of the savings that can be made by the use of an oversize turbine, Talbott said. "We estimate that the use of the engine overheat cycle will reduce costs by 30 percent," he said.

"We are certain our overall engine requirements will be reduced by about 25% by this operation. A 75% reduction in engine size will be equivalent to a 25% reduction in the weight of deliverables when we remember that a single 150-mw unit about 575,000 lb. is about \$16,000 and a 140-mw power plant about \$75,000."

■ **Efficient**, **Economical**—Talbott said the backbone of the air logistic trans-



TURBOFOP-POWERED LOCKHEED Newer Constitution (left) is second in new thin-lipped wing, 27 ft. longer than present model.

If It Gets Orders Now for Airline Turboprops . . .

Lockheed Can Deliver L-1449s in 1957

Burbank, Calif.—First airframe delivery of Lockheed Aircraft Corp.'s new L-1449 turboprop Super Constellation is expected by June or January 1957, if orders are received.

The first of the Super Constellations, powered by two Pratt & Whitney PT2 turboprop engines, is programmed to fly in August 1956. If it is undelivered, Lockheed will then seek an prototype as such but the first three production aircraft of the assembly line will be used as test airplanes, much as Douglas Aircraft Co. did with its DC-8.

CAA certification is expected in March 1957, following fuel delivery with an N license in January.

Proportionally, Lockheed also will build a static load model which will be used for pressure tests to determine whether to have control rod on the British Crosses.

The Burbank firm probably will not run the pressurization tests in an underground tank in the British site but will do so testing in the Mojave Desert near Palmdale, Calif., with a retaining wall built around the aircraft in perfect structural failure.

"We do not expect any problems whatever of that type," says a company spokesman. "But of course the aircraft will be analyzed on the basis of the Control Models."

The L-1449 is designed to operate at 30,000 ft.

The Lockheed schedule is believed

to call for production of 44 to 50 of the L-1449 by the end of 1957. The company will cut half production of the conventional L-1446 Super Constellation and take a share of that market come January 1958.

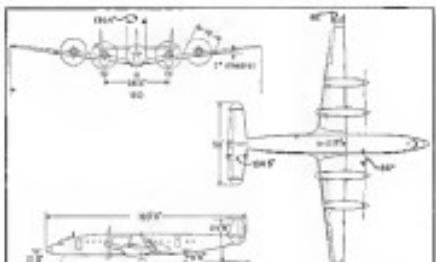
The new turboprop airline is crucial and Lockheed's answer to the challenge laid down by both the Douglas DC-7C with its Wright Turbo Compound engine, and the DC-7D, which may be powered by Rolls-Royce's R.R. 109 turboprop powerplants.

With a long range and a cruising speed above 420 mph., the new turboprop

"is not offered as a substitute for the jet transport," says Leonard Schwartz, Lockheed's director of communications.

The new turboprop airline is crucial and Lockheed's answer to the challenge laid down by both the Douglas DC-7C with its Wright Turbo Compound engine, and the DC-7D, which may be powered by Rolls-Royce's R.R. 109 turboprop powerplants.

With a long range and a cruising speed above 420 mph., the new turboprop



THREE-VIEW shows planform and dimensions of proposed L-1449 turboprop transport.

TWA Dilemma: Turboprops or Jets?

Recent Hughes company modifications of Trans World Airlines' still a deliberating whether TWA will order up of the Lockheed L-1449 as an alternative to the Avrojet Avro 748. It was indicated that no decision is expected until early next year.

Hughes is undecided as to whether, once he sees how soon Boeing 707 jet transports can put into transcontinental and trans-Pacific service, St. Louis' competitor will be forced to take the turboprop Super Constellation away.

Hughes knows he would have to pay more on Lockheed's new line if the L-1449 goes into production, but he is inclined to decide that Boeing can meet the delivery dates of a competing jet, but is not in a position to do so.

The 707's entry making one division for TWA's new turboprop equipment for TWA.

It was industry opinion last week that

if the 1449 is not ordered by TWA, which would need about 35 slots, the plane probably would not be built at all.

Meanwhile, other industry observers said they doubt if any large-scale turboprop jet transports would be ordered by any airline until the Avro 748 comes into service.

Rising costs have forced one such airline that carries it as the fast Asian route to upgrade its cargo equipment.

Obstruction to cargo and passenger traffic will be enhanced once it is clear whether the additional military order.

Any other expansion such as Lockheed or Douglas—this will be in commercial business if either or both wins the USAF contract for jet bombers contemplated in the next future.

passenger is expected by Lockheed to offer superior performance to both the DC-7C and DC-7D.

"Using only normal wing load capacity," says the Burkhardt line, the Super Constellation turboprop can fly a distance greater than that of any contemporary turboprop in transoceanic transport and corresponding to the altitude range of any expected long-haul transport—with a fair margin."

With the turboprop engines providing 60% more shaft power, Lockheed can save fuel costs per mile will be 19% less than "the latest commercial transoceanic performance of the DC-7C. But also after a considerable speed edge over the DC-7D although the latter would be comparable in range

but now Lockheed claims, together with the dropoff of miles flown as a world wide manager, has brought the earliest competition between both American and British aircraft manufacturers to a standstill.

A number of airlines, including some already committed to the DC-7C, are looking to take a closer look at the Lockheed proposal.

On the basis of announced figures

for the 1449, which Lockheed believes will be the most competitive rate, the new turboprop airline will save 19% on transoceanic performance of the DC-7C. But also after a considerable speed edge over the DC-7D although the latter would be comparable in range

and economy. That, of course, would depend upon the engine used and on the TD.

Lockheed engineers feel the L-1449 will have a lower unit-mile cost than the TD.

The Douglas Super Sixty will be ready to replace a year earlier than the new Lockheed aircraft, however. Pan American World Airways expects to put the DC-7C into service this summer 1956, while Trans World Airlines' long-range start operations with the Avro 748 in the summer of 1957, if it goes ahead with its order.

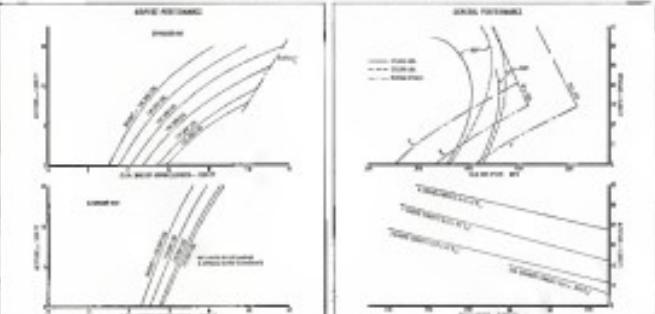
Pricing tag on the L-1449 will be \$2,600,000, compared to \$2,750,000 for the "C."

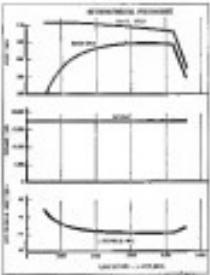
► **DCT's Strutless**—Douglas, of course, has further plans still in the DC-7T status as one master in the Lockheed proposal.

Now in the drawing boards at Santa Monica is a thin-wings version of the DC-7C designed for an unpowered transoceanic engine which would cruise at 620 mph. with 110 passengers. Engines for this might be considered a variant of the Pratt & Whitney T38 or Bristol BE-25.

► **Simple Turboprop**—The new Lockheed aircraft could take any of the turboprop engines mentioned above since that have been passed. The company selected the PT2 because it is a reliable and atmospheric single-epoch turboprop that has been under development for years.

"But as the engine for '77" says a Lockheed representative, "the company does not believe at the time is important, but perhaps it would not be available until a year later than the PT2. There will be improvements





Trippe Outlines Air Role in Cold War

Vital role of U.S. aviation in winning undeveloped countries to either side of the Iron Curtain was described by James T. Trippe, president of Fox Aviation World Airways, at Washington's Aero Club Wright dinner.

In a simple conclusion that a country cannot develop unless it has a proper transportation system," Trippe said. He added that many underdeveloped countries exist that will not rail and highway systems to be developed.

Airlines Opportunity. "Crisis upon crisis political conditions force them to stop these earlier stages," he said, "and enter directly into the age of flight."

By upgrading and improving the internal transportation systems of pre-existing underdeveloped countries represents a great opportunity for American aviation to be of service. Its capital and know-how in partnership with local investors, and supported by appropriate medium term credits to vitalize the local capabilities of commercial banks, can immediately strengthen the countries we wish to be our friends."

Wright Day-Dithers Wright critics never fully satisfied.

Coffee Trophy. Trophy was presented by Captain Edward C. Irwin H. Kindred, head chaplain of North American Aviation, Inc., and Edward H. Hinman, chief engineer of the El Segundo Division of Douglas Aircraft Co. *(Aviation Week Dec. 13, p. 18)*.

Wright Brothers Memorial Award. Presented to Dr. Theodore Van Karsen by the National Aeronautic Assn. *(Aviation Week Dec. 6, p. 7)*.

Stevens Combustion chamber. Created into eight segments, each with a dual-orifice fuel nozzle.

Engines noise study looks that prevents feedback engine and propeller rotation.

More than double hangarage per plane of weight.

Lieutenant Colonel John F. Conroy, commandant of a new flight wing, is pushing redesigned Super Constellation to a block speed 75 mph faster than "any current or forecast piston engine commercial transport" (DC-7C) and 16 mph faster than "any projected propeller-driven, longrange, commercial transport" (DC-3D).

The 1949 features a sensitive frequency control system with single-point autoreversing controls. A tail is mounted within the wings and no tip tanks are planned at the moment.

For other features of the new airliner, see *Aviation Week Dec. 6* (p. 17).

Lt. Col. James B. Virdon, USAF, for a 15-min straightaway record of 712.945 mph in the F-86.

Lt. Col. Frank K. Everest, Jr., USAF, for a 15-min straightaway record of 713.149 mph in the North American YF-86A. Col. Everest is the current holder of the absolute world speed record.

The B-57 could be awarded to William D. Thompson, Jr., Convair Assistant Co-pilot, for establishment of a world's altitude record of 71,081 ft. as a high-altitude aircraft (one weighing less than 2,304 lb.).

Airplane flight was made in a turboprop-powered Convair XJ-17B. The plane was powered by a Boeing RB-57 engine.

study on the turbine section and the gear ratio. A 12.5% improvement is forecast in its economic curves as a result.

PT-2 Highlights. Features of the 6,000-hp turboprop engine are listed as:

- Steel construction with the outer engine, except the reduction gear housing, made of corrosion-resistant steel alloy.

- Simplicity resulting from single-unit design with solid compressor-turbine assembly.

- Low operating temperatures that eliminate the need for complicated internal cooling of turbine blades and vanes.

- Reduction gear ratio that keeps the propeller tips in the turbine stage at all times.

- Anti-icing provisions with hot compressed air ducts as piping through low rate gear cases and ports at the engine.

- High energy capacitor-type igniter system that makes weight static power savings.

- Self-starting combustion chamber created into eight segments, each with a dual-orifice fuel nozzle.

- Engine noise study looks that prevents feedback engine and propeller rotation.

- More than double hangarage per plane of weight.

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Hunsaker, Crawford Appointed to NACA

Dr. Jerome C. Hunsaker of Massachusetts Institute of Technology, and Frederick C. Crawford, chairman of the board of Thompson Products, Inc., have been appointed to five-year terms as the National Advisory Committee for Aeronautics.

Hunsaker, a member of NACA since 1935 and its chairman since 1941, was reappointed. Both appointments, by the President, date from Dec. 1 of this year.

Navy Plane Designer. Graduate of the Naval Academy, Dr. Hunsaker has been identified with aviation since 1912, when he was detached to Europe for a year's study of aeronautical engineering there.

The following year Hunsaker set up MIT's Department of Aeronautical Engineering.

From 1916 to 1926, when he left the service, he directed the design of many naval aircrafts constructed. Most notable among these were the NC-type flying boats from 1916 to 1931 he was associated with Bell Telephone Laboratories and then Goodyear-Ryan Company.

In 1931 Hunsaker was named head of the Department of Mechanical Engineering and Aeronautical Engineering at MIT.

He is a director of numerous companies, including the McGraw-Hill Publishing Co.

An Foundation Child. An electrical engineer trained at Harvard University, Crawford has been with Thompson Products since 1916. He is head of the Air Foundation which sponsored the National Air Races until 1949 and since has sponsored the National Air and Space Show.

Crawford is active as the editor of the National Aeronautic Assn. and was responsible for Thompson Products' support of the Farnborough

Bleed Air Requirement

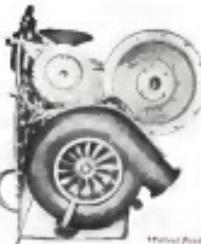
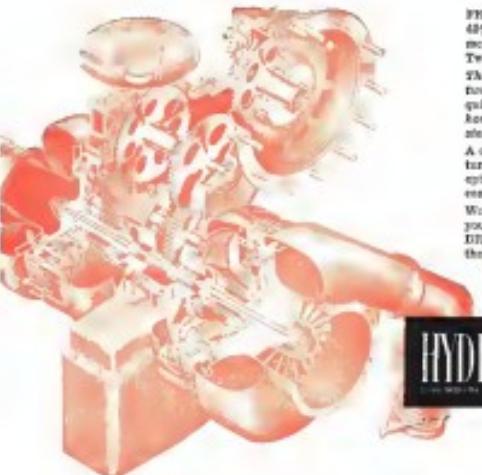
Of particular interest is the way the Delta 1000 refrigeration system achieves the individual optimization of the refrigeration turbines while utilizing the after turbin air to heat performance throughout the power requirement range. By utilizing two turbines instead of one, optimum design for refrigeration needs is not compromised for variable power outputs.

No auxiliary equipment. The obvious weight savings due to the lack of auxiliary equipment is also evident. "We believe Hydro-Aire has made another remarkable contribution to turbine engineering," states R. H. Knudsen, President.

*"Twin Turbine Teamwork"
—a New Principle
in the ATM Field!*

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A SINGLE PACKAGE, COMBINING AIR CONDITIONING AND ACCESSORY DRIVE FUNCTIONS



FRIJADRIVE offers weight savings of 25% to 45% and saves up to 30% in bleed air requirements. It is based on an entirely new principle: Twin Turbine Teamwork.

This principle provides speed control within two-thirds of a percent. Auxiliary power requirements are very low due to massive horsepower. At the same time it supplies customized air conditioning flow to the cabin. A control system compensates each of the two turbines as required, thus maintaining optimum efficiency at all times for both air-conditioning and accessory-drive functions.

We'll be most happy to meet with you and show you exactly how it does... and what **FRIJADRIVE** can do for YOU. Call, wire or write for the complete story NOW.

Every fighter, every tanker,
every transport,
every Hydro-Aire equipped.

HYDRO-AIRE
The Aviation Subsidiary of

CRANE Co.



Spotwelding .240 75st Aluminum Stringers to .081 75st Clad in Wing Section on F-84-F

These heavy section stringers are a Breslow design improvement in wing structure of the battle proven F-84-F Thunderjet. This instance of improved design with resistance welding is not unusual—Reinbold design engineers are specifying five times more resistance welding in wing assemblies and three times more in fuselage assemblies than ever before.

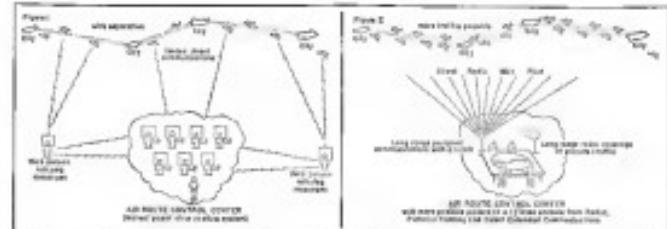
The advantages of resistance welding in both airframe and jet engine fabrication are well known. Aircraft and Military specifications are most easily satisfied and maintained by Bevelay precision TIG or Power welders. That's why approximately 99% of all the resistance welding in aircraft fabrication is done by Bevelay machines. Write for Bulletin 1348T for information on Bevelay Type BT aircraft welders.

The Bevelay Type BT welder shown above is one of many at Republic proving its daily production Bevelay's basic thinking of machine design to do more useful work at lower operating cost with maximum reliability.

Largest Manufacturers of Electric
Resistance Welding Machines in the World

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IMPROVED TRAFFIC FLOW is expected when present air route control centers (left) get new facilities (right), including long-range radar.



PROJECT VOLCANO, AF's automatic air traffic control made up of radar (left) and computer plus displays (right), calculate flight paths.

Report on ACC Projects:

Civil-Military Navaid Progressing

The language program to improve the Common System of civil-military navigation and air traffic control and navigation is showing significant progress, reports Robert Murray, Civilian-Airway Undersecretary for Transportation and Air Coordinating Committee chairman.

The study is being made by a special ACC group composed of government and industry representatives. Plans are under consideration now.

A potential presentation at an early summer meeting of planes enroute on the same route.

► **Radar Control**—Present system of plotting air traffic involves complicated communications and coordination between controllers. Various aircraft positions, altitudes and speeds are written on strips of paper and passed from one controller to the next during the process.

The ACC group is working with the Civil Aviation Administration's Technical Development and Evaluation Center on a radar map-planning device that enables controllers to see aircraft in their progress along the high-density routes.

► **Combining air defense and civil radar systems**—

► **Increasing range and word of long distance radar**—short aircraft test runs made in this test in August. This enables the controllers to prevent collisions while clearing incoming numbers of aircraft.

► **Direct Communication**—The ACC group is making every effort, Murray

says, to integrate available civil and military radar with the special air defense network and other military radar to increase the volume and safety of air traffic.

A successful integration "could save millions of dollars in future appropriations for our expanding service system," he adds. "It may also provide the long-range radar component of the missile system."

► **Provision for direct radio telephone communications between pilots and controllers at a radar site**, ACC reports.

► **Volcanic Definition**—An example of Volcanic definition—air traffic control using computerized computers to develop a description of a volcanic system, Murray cites the report by Air Force Undersecretary James H. Douglas to have ACC evaluate "Volcanic." The ACC group visited Volcanic in September, research and approaches of 30,000 kilometer tests demonstrated.

The group's preliminary investigation revealed certain operating difficulties concerning the use of Volcanic in the common system, Murray says. "Evaluation may reveal the possibility of eliminating these . . ."

Sikorsky Steel BT-12 Basic Trainer
Powered by a Pratt & Whitney
450 hp engine, the BT-12 had a top
speed of 180 mph, cruised at 145
mph, climbed at nearly 1000 fpm.



Bell Chairman Sells 10,000 Stock Shares

Bogart of 10,000 shares of Bell Aircraft Corp. excess stock by board chairman Lawrence D. Bell is reported by the Securities & Exchange Commission for the period of Oct. 11 to Nov. 10. Chairman Bell's manager stock holdings now total 3,000 shares.

Other aviation industry transactions:

Aerospace Industries Inc. Disposed of 100 common shares by James A. Rudden, director and treasurer.

Air Dimensions, Inc. Disposed of 500 common shares by C. Kenneth Baumer, director.

Airways Airlines, Inc. Disposed of 1,000 common shares by Paul C. Thorne, supervisor of maintenance.

Airline Systems. Acquisition of 110 common shares by Wayne G. Ladd, director.

American Avionics Inc. Disposed of 1,100 common shares by John W. Linkous, director of engineering, and a total holding of 2,000 shares.

Aviation Aircraft Corp. Disposed of 470 common shares by Milt E. Johnson, director.

Beech Aircraft Corp. Acquiring a holding of 10,000 shares of 400 common shares in

Blue Chip Airlines Corp. Disposed of 100 common shares by Arthur H. Shultz, officer.

Borg-Warner Corp. Disposed of 110 common shares by Charles H. Stroh, officer.

Cessna Aircraft Co. Acquiring a total holding of 2,000 common shares by William A. Knobbe, director, president and

chief executive officer.

Coupled Avionics Inc. Disposed of 100 common shares of 200 common shares, chairman, president and CEO, and acquired all 100 common shares by David Davis, officer and director, president and CEO.

Diamond Aircraft Industries Inc. Acquired 100 common shares by Donald L. Frawley, director, with a total holding of 1,100; acquisition of 100 common shares by Robert F. Frawley, director, resulting a total holding of 1,200.

Safety Record

All-time safety and traffic records for U.S. airlines in 1954 are predicted by Civil Aerodynamics Branch, Civil Aeronautics Board. Civil Aeronautics Board says for the year ahead a record low passenger fatality rate and a record high number of passengers carried will continue.

The safety forecast is based on records to date and on estimates in the fall of this year. It shows a passenger fatality rate of 0.08 per 100 million passengers miles for U.S. scheduled carriers, international and domestic air carriers—a record low.

Long U.S. airports air carriers have operated without a single passenger fatality since 1948, according to Board estimates; the ten-year total will carry about 490,000 passenger miles approximately 1.3 billion passengers.

CAB reports scheduled domestic, foreign and territorial airfares to carry 19 million passengers and 51.2 billion passenger-miles. These estimates are based on actual figures for nine months of operation.

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PIONEERED STAINLESS STEEL FABRICATION

In 1931 we built and flew the first stainless steel wing. In 1946 we designed and built the first stainless steel commercial craft, the Fleetwings Seabird. In 1959 we designed and produced the first military seaplane of this material, the BT-12 basic trainer. Recent contracts for stainless steel fabrication include structural components for the Martin B-57 and Republic F-105, and propeller jet engine components for leading manufacturers. This extensive experience in stainless steel fabrication is yours for the taking. May we help you?



In the tradition of the 1931 Seabird for
HOTEL SEABIRD

FLEETWINGS DIVISION
KAI SER METAL PRODUCTS, INC.
BRIXTON, PA.
IN THE HEART OF THE DELAWARE VALLEY

An experienced source for
AIR DATA COMPUTERS . . .

Bendix

We honestly believe we can offer you the finest Air Data Computer that money can buy.

For one thing, we've been in the business of making precision pressure-operated instruments for thirty-five years . . . and we've been making surface electro-mechanical computing devices for more than six years. That's a whole lot of experience.

And here, for example, are two big problems we've licked. E-P Air Data Computers are now available:

1. Computing for probe position, error in probe location of Mach number.
2. Operation up to altitude of 150,000 feet.

Behind all this is an unmatched team of designers, engineers and fabricators who, by training and experience . . . are specialists in fine precision instruments. They are the inventors of our latest Air Data Computer that weighs in little to 12 lbs., occupies only 250 cubic inches (including power supply and amplifier) . . . and is capable of delivering all the functions demanded by modern, high-performance aircraft.

Why not put all this experience to work for you?

Eclipse-Pioneer

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Aviation Instruments and Accessories

AERONAUTICAL ENGINEERING

Time is the most important commodity to engineers; the technique of using it is varied and ingenious, because time equals money, manhours, materials—and progress.

One area where the importance of time has been demonstrated is in testing. Adequate testing of any engineering subject produces quantities of raw data which must be read, processed, reduced to useful form, analyzed and tabulated before being of any real value.

Here is one significant approach to time-saving in windtunnel tests: automatic data reduction. With these new schemes of electronic reading, reduction and tabulation of thousands of data points, time between tests and results is reduced to a matter of

minutes rather than weeks at formerly took.

The Convair system described here is from material furnished by R. J. Voller, chief of their aeronautical windtunnel, and M. G. Wade, assistant testwork group leader.

More information on other successful systems can be found in two AGARD Monographs "Methods Used in NACA for Data Reduction," by Dr. H. Abbott of the National Advisory Committee for Aeronautics (AGARD AG-3/M2) and "A Scheme of Automatic Data Reduction in Windtunnels," by K. V. Dwyer, of the Mathematical Services Department, Royal Aircraft Establishment, Farnborough, England (AGARD AG-9/M5).

Data Digesters Speed Windtunnel Tests

One major drawback in windtunnel testing—the time delay between the test and the availability of corrected data—is eliminated by automatic data reduction equipment. Such a system, installed at the Defense Aerophysics Laboratories, operated by Convair Division of General Dynamics Corp., Dogpatch Field, Tex., has been in constant use since 1958.

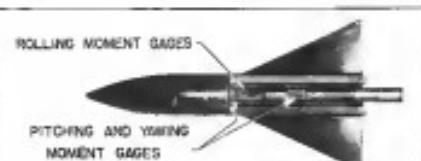
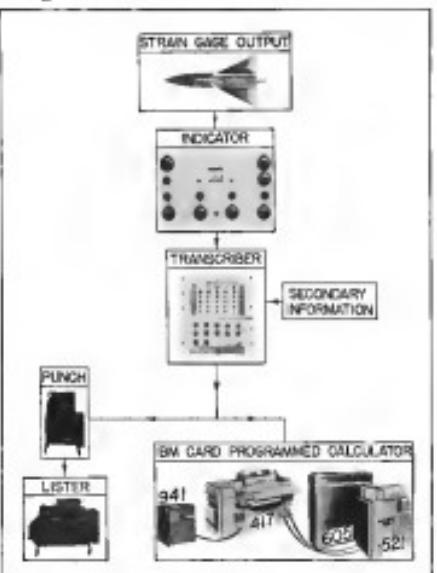
An example of how useful a recent improved design differs from its predecessor shows: 25,000 pressure data points from a 10-in. Class 0.0001 pressure data probe were immediately recorded on IBM cards and were ready for computation with almost no time lag. Up to date the old procedure of photographic processing, reading, pasting and averaging, it would have taken nearly 115 manhours to process the data to the point where computation could proceed.

The system at OML was first used in 1953. It is based on the conversion of strain-gage voltages to digital information which is utilized to supply information through an IBM and program calculators for computation.

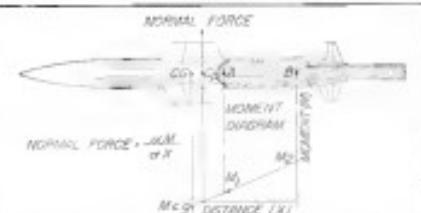
Use of the Tunnel—The major effort at the OML windtunnel is development testing of supersonic guided missiles for the Navy's RIM-2 Terrier and Bullocker projects. The facility is owned by Naval Ordnance, and it is operated by Convair for them. Additional work in the tunnel is done for contractors so the United States Air Force and the Navy Bureau of Aeronautics.

Missile numbers between 125 and 250 are available for testing models.

GRAPH SHOWS FLOW of information in Convair's system for the automatic reduction of windtunnel test data



CUTAWAY MODEL shows typical two-stage-type external balance installation.



TYPICAL continuous panel bending moment record for wing of nosecon structure.

of missiles and airplanes. Instrumentation, developed at OML, records each component force data simultaneously, and automatically reduces the data to nondimensional parameters.

Convair's strain-gage system features use of the model with four strain gages, each employing a full bridge circuit. These gages measure the strain due to bending moment at the centerline bays represented by the model. Knowing the moment at two points on the bays, the normal force can be derived from the slope of the moment curve. Accuracy is increased by placing the four-wire set of gages as close as possible to the reference point about which moments are measured, for most winds the center of gravity.

The system reads the voltage output from the bridge, and produces a voltage of equal magnitude and opposite sign. This voltage is balanced by means of a servo-driven stepmotor-driven shaker mechanism. The resulting servomechanism operates fully for a total unbalance of 10 mils, or up to 0.001 in. of the transverse section. Servodrive information is fed into the transducer by the use of an IBM card reader keyboard. The input includes model and aircraft longitudinal, migration, pressure and the run number. Model angle of attack is automatically fed in.

The digitized information passes through the transducer to the punch where the raw data are recorded in standard IBM code. After the runs have been punched, the same data are read into the computer.

Just before printing, the raw data are sorted to the card arrangement established earlier where it is reduced to nondimensional data in coefficient form. In the programming unit, the computer

calculates the difference between the strain gage signal obtained under load and the reading under zero load. These data are now stored and called for in subsequent computations. All computing is done by the 603 unit except for minor addition subtraction.

Final answers come in the 417 unit, are then reduced to the punch, for recording, and results are also plotted in the 417 unit.

Computed coefficients are generally obtained within 20 to 25 seconds after the system is assigned. They may be presented in one or two tables of data together with angles of attack and pitchroll moments for definition of the model support under load. A wide variety of aerodynamic parameters may be computed on the spot, and an available immediately to set up to verify decisions of the test program.

► **Accuracy.** A digital computer automatically introduces no inherent errors in the data reduction, but does make some errors which are seen as the automation applied. Thus the accuracy of the whole system depends on the accuracy with which the strain-gage voltage output can be read.

For wind tests at OML, normal force can be measured to ± 0.2 lb., and pitching moment can be determined to ± 0.6 in. lb. These figures compare to approximately $\pm 3\%$ and $\pm 0.5\%$ of the maximum loads generally encountered.

► **Other Systems.** OML has used both digital and analog data reduction devices, and they feel that there is no advantage in the analog method if the continuous testing of non-linear windtunnel data is required.

The accuracy may vary with installations and conditions, that of wing bending moment as a function of the air attitude of a model at a constant angle of attack. Convair says that the simplest form of analog computer, combined with a readout plotter, will continuously record the load of a test fixture as the model is tested. A typical example of a continuous panel bending moment record is shown in Figure 1. For the right side of a cross-section, wing-body combination with the wing horizontal when roll angle equals 0 deg.

Engineers believe that further development of continuous conversion recording equipment will provide valuable tools for exploratory windtunnel tests and the means to define regions of low-lift, adverse-drag characteristics.

► **Pulse Testing.** High-speed data reduction of pressures measured at various points on a windtunnel model have long been a problem of major proportion. Recently, pulse-aided photo-electric devices have been used to measure the pressure distribution on a specially deformed and lighted model. This uses a solid-state



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INDUCTIVE CONSTANT TEST KIT Measures insulation of circuits (such as rings) at 0.01 to 3.50 ohms. Insulation test cell for fuel samples. Direct measurements are obtained without calculations. Battery powered. (For use in field or lab use P/N 387083)

PORTABLE CAPACITANCE STANDARDS KIT Provides a series of three new capacitance standards for checking calibration accuracy of three-wire capacitance bridges and other three-wire capacitance test equipment. Capacitors certified by U.S. Bureau of Standards. (P/N 387089).

Write for detailed information on the full line of SIMMONDS Test Units for capacitance Fuel-Gage Systems.

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tions are so complex that without tests are generally run by taking data at pre-determined points over a wide range. This frequently results in increased testing time and taking redundant data in order to benefit the normal margin of the various parameters.

The use of the automatic recording manometer means that the necessary computations at each point can be completed in about 10 sec, and the test engineer can quickly locate a particular test to recheck.

This pilot model automatic manometer can track signals to evaluate the problems associated with such equipment and to evaluate the accuracy obtainable.

Calibration tests conducted recently showed that 99.2% of the pressures provided were within ±3% of memory of the correct pressure, which is the design accuracy of the competing equipment.

A final working model developed at OAL will have 60 tubes reading to the nearest half tenth of an inch and thus will service 85% of the pressure testing requirements of the Boeingfield establishment.

Computer Results Shown in 'Window'

A new device can usually display the results of digital computer calculations on cathode ray tubes, eliminating the pesky bottleneck of printing out such results.

Developed by International Business Machines Corp., the device can project computer-generated graphics in the form of graphs, geometric figures, engineering models, and solid and wireframe. It is called the Type 740 CRT Display Reader, and is designed for use with IBM's Type 750 and 760 computers.

If the computer is sending out an engine's flight path, the stored data can be displayed graphically on the Type 740's 23-in. CRT. If the problem is to determine the shape of a car, that too can be displayed visually. The user



WORKS CR. PICTURES ON COMPUTER'S SCREEN
 ARE USED TO SHOW COMPUTER OUTPUT



Boring employees watch roll out of 1000th B-47, covered with their contributions to a showstopper registration.

The 1000th B-47 comes off the line

In March, 1950, the first production B-47 rolled out of the Boeing plant in Wichita, Kansas. On October 14 of this year, the 1000th Boeing built B-47 came off those same assembly lines

The Boeing B-47, like being produced by Douglas and Lockheed, is the Strategic Air Command's front-line, high-altitude medium bomber, and is capable of carrying a nuclear weapon 10 miles a minute. Already SAC's Second Air Force has four

completely equipped with B-47s, making it America's first all-jet striking force. Additional SAC units are in the process of making the move transition to jets.

Boeing's Wichita Division has, from the first, carried out continuing programs to lower production costs and to maintain on-schedule delivery. The advanced B-47 is now being produced with fewer man-hours per pound than were required for the

much less complex B-29 during World War II. As a consequence, the cost of the B-47 has been reduced well below the best original estimates, and resultant savings have been passed on to the government.

Today, handles building B-47s, the Boeing Wichita Division is turning up as a second manufacturing source of the B-52 eight-jet heavy bomber, which is now in production at the Boeing Seattle plant.



This great airplane is the Boeing Air Transport's strength and chief achievement.
 It is built for such distinguished as the B-52, B-47, KC-135, and now the B-52.

BOEING

information is also displayed on a small 7-in CRT which can be photographed by a 35 mm camera.

The new recorder can display sampled data points at the rate of 8,000/second, providing output speeds comparable with the computation speeds of the 701 and 704.

Accuracy of the visual display is within 5% on the logic tube, and is within 0.1% in the count mode, according to IBM.

An versatile programming tool requires the CRT display and the operation of the console can be controlled automatically from the computer itself, IBM said.

Franklin Tests New Supercharged Engine

Tests are being made in a test-flood Islands, 15-18 (5-12) kilometer of a new Franklin supercharged engine and is claimed 100 bhp from an area level to 3,000 ft altitude.

Engines and ram-air supercharger have separately controlled airflow. According to Franklin, the new engine, the Safety Zone, N.Y., appears. The powerplant is also adaptable to liquid metal combustion with ease of system changes.

The new engine, designated OH-25-

1, is a development of master Franklin engine research society, the OH-25-1. (Aviation Week Aug. 21, p. 24)

The turbocharged, designed and developed by Aercooled Motors, will supply 90% of maximum shaft horsepower at the compressor inlet up to 16,000 ft., although the engine is guaranteed only within this limit to 10,000 ft. This tube is its present form, but is planned to expand up to about 480 kg. and shaft horsepower could be limited to 200 hp at sea capes.

It features a radial discharge, back-

wand skipping impeller and a single-

stage air-cooled turbine while having

cost little blades. Blades are slanted,

twisted and hollow. They are welded

to the discus radially to reduce total

turbine hub by an automatic shedding

at 10,000 rpm. The tube operates at

16,000 rpm with maximum allowable

gas inlet temperature of 1,625°.

A snapshot, developed by Elkay-

Pneumatic Division of Bendix Aviation

Corp., is designed to limit the super-

charger's maximum speed and to main-

tain, at no additional cost, the manifold pres-

sure maintained by the pump. It operates

individually on engine oil pressure and automatic throttle and exhaust gas waste gate.

Aviation Safety Studies Available

A series of non-technical reports on research and development in aircraft design and operations has been made available by Flight Safety Foundation.

To obtain copies of the reports, write to FSP. Single copy price is given. Price for quantity orders are available on request. Address: Flight Safety Foundation, Inc., 471 Park Ave., New York 22, N.Y.

■ **Protective Design is Forecast and Recommended** (Aviation Safety and Transport Agency). Description of the contemporary flight deck. (See Dec. 1968, Clash Injury Research, SAM, page 34, pp. 347-352.)

■ **Tireless Tools for Air Transport**. An article from 1968 Wright Brothers Lecture, Dec. 1962. William Lefeverow, Avant Airlines. 15 pp. FSP #56.

■ **Bureau of Research Projects in the Field of Aviation Safety**. A report on research and development of 1,100 projects in the field of aviation safety. Includes activities on early man-in-the-loop projects, Canard/Gangham Aviation Safety Center. SAM 49, Jan. 1973. FSP #10 60 (See #31).

■ **Research and Development in Personnel Safety in Aviation**. Report on current design and operation and recommendations for additional research. By D. T. Wright. SAM Report. 28 pp. Sept. 1970. FSP 256.

■ **Vibration, Progress and Safety**. Second Annual Hand, Foot and other studies of measurement of safety vibration. By Lofmark. SAM paper. 5 pp. March 1971. FSP 257.

■ **Safety Survey of Pacific Coast Aviation**

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information is also displayed on a small 7-in CRT which can be photographed by a 35 mm camera.

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Industries. Review of accidents in colleges, industries, and airlines connected with seat belts after W. L. Lewis, Western Rep. Guggenheim Area Safety Center 27 pp. Jan 1951. *Fairchild* 214.

• **Commercial.** Report of Transport Safety Committee. "Presentation of new research measure," "Defenses lost," to have for aircraft safety. *Rodrigue Studies*, 1951 Annual Meeting paper 7 pp. Jan. 1952. *Fairchild* 215.

• **Aerospace.** Developments in the Field of Landing Speed Reduction and Hovering Arrest. "Outline of achieving slow-speed controlled flight and vertical landings." Durst, H. A. *Aircraft* 4 pp. May 1951. *Fairchild* 216.

• **The Airlines.** Defense to Human Engineering. "Outline of the design and production to assist the designer and operator to achieve greater safety." Lynn S. Beck, Jr. *Special Devices* 4 pp. May 1951. *Fairchild* 217.

• **Automobiles.** Contribution of Automotive Engineering to Aerospace. "Develop critical areas under consideration before turning attention to design." J. Lehman, Amer. Soc. for Eng. Education lecture 15 pp. June 1951. *Fairchild* 218.

• **Industry.** Influence of Safety and Aerodynamics on Aircraft Design. "Outline concepts to improve aircraft handling load. Five general types of damping for safety." J. Lenhart Third International Conference, 148 pp. March 20, Sept. 1950. *Fairchild* 219.

• **Automobiles.** Principles of package design. Haug, De Harve, Czech, Ingem, Ravnak. 521 pp. Jan. 1952. *Fairchild* 220.

• **Human Factors in Design and Operation.** Application of human factors principles to aircraft design. Lewis, R. V. McFadden, Maxwell, and Jones. 14 pp. January 1952. *Fairchild* 221.

• **Human Factors in Aircraft Accidents.** Postaccident analysis of human factors contributing to cause of accident. E. A. Nyquist, R.M.D. Report 10240 Monthly Bulletin. 4 pp. September 1952. *Fairchild* 222.



USAF Tests Bomb Ejection Pylon

Pentagon Aviation Corp's flexible ejection pylon for free falls (Aviation Week, Nov 15, p. 68) has been found equally useful for ejection loads from their racks and insurance that they do not contact the aircraft. Tests of the device will cover various types of loads

from 1000 lbs. USAF Assessment Center, Eglin AFB, Fla., likes an instant 4000-lb. ejection load as fitted by a Pentagon spokesman. In P-51, 5000-lb. ejection charges separate the load at 10000 ft. or more regardless of plane attitude.

AIRCRAFT WEEK December 27, 1954

Facts about *HELI-COIL* inserts in the aircraft industry

What they are. Helic-Coil screw thread inserts are precision formed sets of threads used in aluminum, brass, bronze, steel, wood, non-metallic materials, and plastic. They provide a tight, permanent, self-locking, vibration-resistant, and corrosion-free connection.

How they are used.

Usually applied in aluminum or magnesium when produced by high-speed aircraft tools, the helic-coil can also be applied to metal, brass, copper, and wood by repeated straight feeds of short lengths. Tools or drivers require extreme care because of brittle metals, sharp edges, and brittle wood screws.

What they are for.

AS ORIGINAL COMPONENTS. Helic-Coil inserts are used to provide stronger, lighter, lessening, vibration-resistant, and corrosion-free connections in aircraft, aircraft parts, and accessories. From the basic use of jet engines to aircraft propellers.

FOR PRODUCTION SALVAGE. When conventional tapped holes are damaged in production fixtures due to the use of incorrect feeds, helic-coil can be used again rapidly with an increase in screw size and no visible signs of re-use.

FOR SPEEDY REPAIRS. When stripped threads are caused by heat, scraping, or corrosion in service, insert them to restore an increase in shear or tensile strength of the original part. No welding or plating—no secondary machining—no expensive wastes.

For tooling uses, and the repair of tools which have become dull in which the previous losses are so great others are doing in your field.

For dry runs. When parts are drilled and tapped in one day for assembly, disassembly, and reassembly, helic-coil can be used to save time and cost. No other method is so simple, safe, and effective.

Helic-Coil inserts increase the load and proof test, yet lighter, without increasing weight.

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Available for National, Commercial, Naval and United States pipe flanges and pipe fittings. They are used in all standard sizes and types of connectors requiring Class 1, 15, or 25 lb. flange load to meet high test ratings of the design. In some cases, the helic-coil can be used in place of the standard pressure fitting. Can be used in any metal, wood or plastic.

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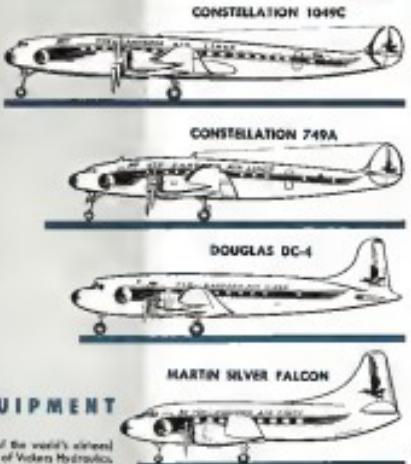
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Vickers Hydraulic Equipment has gained by hundreds of thousands of hours in the air in terms of longer life, greater dependability, better performance and lower maintenance.

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"God sent me many, gentlemen, let nothing you distract
Remember that His strength is
doubtless ready.
There's just one major problem: Who
is carrying it which way?
Oh, ratios of comfort and joy, my
etc."

"Oh, little town of Bethlehem, how
still we see thee lie! Above thy wood, silence sleep the
sons from death by.
The star that led the shepherds is a
sainted guide.
The wise men are in hiding, but there
is no place to hide."

"Mark the broad angel sing
Bigger boulders are the thing
Prove in earth they guarantee
By Hail, the stars are
Proof, all the nations rise,
Give or take for my peace.
So that we may better be
Proud to strike back instantly
Flash, the Air Force sing reg.
Bigger boulders are the thing."



Flaming "Saucer"

Flame torch welding at Wartechna Research Laboratories is reported to result in higher-efficiency jet engine combustion chambers. Using a specially designed valve system in which unheated propane can be varied from an level to 60,000 ft., Wartechne engineers can develop a flame intensity flame suspended above the houses. Using a nozzle thermocouple, or pyrometer to check heat, they can regulate the flame and control its characteristics and burning efficiency. In this manner they have been able to make use of a small space to liberate the most possible energy.

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INVERTERS



FRACTIONAL H.P. DC MOTORS



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DYNAMOTORS

PRODUCTION BRIEFING

► Schedule delays at Northrop Air craft, Inc.'s production lines are now substantially reduced to a central control area by means of Teletypegraph system, the automatic method of transmitting handwritten messages commonly used in business, health and other fields. Long transmitters are installed at 37 stations, with the return cycle of handling up to 60. The Hughes Aircraft Company expects backlog to total up to \$175,000 annually.

► Radioplane Co., Van Nuys, Calif., has entered a \$10,000,000 ft. building to house its expanding Wireless Systems Division. Approximately 180 engineer personnel will be assigned to the space. Existing building is to be used on high-speed, high-altitude piloted aircraft and guided missile projects. The firm has backlog more than \$6,000,000 aircraft aircraft as part of its flight design progress.



SAYINGS of five men hours a day are being made at Texas A&M Corp. by pressing a stoppage tape over auto-hitch platen "splicer" used in making plastic dies. The existing process involves cutting the plastic sheeting strips, an expensive material, plastic, Corian & Dura-Chrom X-2000, normally used in printed sheet aluminum during bending, forming and routing.

► Aerotech Corp., New Bedford, Mass., has acquired Henry L. Capley & Co., Inc., West Orange, N. J., maker of powder and wet catalyst products used in electrical and electronic applications.

► Bendix Foundation is new name for former Eclipse-Pioneer Foundation Division, Teterboro, N. J.

► Chicago Avionics Industries, Inc., is newest of former Chicago Avionics Survey Co., Chicago, Ill., in accordance with its expansion of research and production in aerial photography and other scientific equipment.

With the transfer of carbon pile voltage regulators and AC and DC generators from the Eclipse-Pioneer Division, Teterboro, N. J., the Red Bank Division of Bendix Aviation Corporation is now in better position than ever to serve the avionics industry's needs. When it comes to special-purpose electron tubes, or electrical power equipment of the types shown above, you can be rest of getting top quality from Bendix Red Bank. Our super modern facilities and highly experienced technical people are always at your disposal. Call us on any basis for recommendations.



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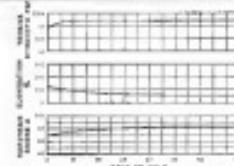
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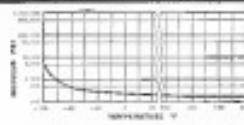
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CLASS 500 (EXTREME LOW TEMPERATURE)



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This handy chart makes it quick and easy for you to select and specify the best G-E silicone rubber for your job.

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1. ON CARGO and these barges are weighed to below baseline as 9-lb. per cu. ft. is the 30-gauge flight as 9-lb. from the mainland to a large 40 miles out in the Gulf.



2. S-61 HELICOPTER, loaded with offshore crewmen, takes off from the helipad on a Grand Isle office parking lot.



3. FORTY MINUTES later the Sikorsky comes in for a gentle landing on the flight deck 40 miles from Grand Isle, Louisiana, R.R. boat, the top taken to some room.

Smoothest and most efficient offshore crew transportation today is the modern helicopter, an aircraft proved in this tough assignment and backed by many millions of hours of operation throughout the world.

Around the clock, dependable Sikorsky helicopters now provide new speed, safety, seasick-free comfort and high availability in the transportation of operating personnel between the mainland and offshore stations.

The pictures on these pages tell the story. They illustrate the smooth "high road" to offshore drilling barges in the Gulf of Texas and Louisiana.

Offshore Drilling Barges

Petroleum Helicopters, Inc., of New Orleans, demonstrates how offshore transportation can be speeded . . . how problems can be eliminated or greatly simplified . . . how costs can be reduced. Already as many as 114 men per day fly to work offshore for a major oil company. Intangible values include higher morale, greater safety and availability of an emergency vehicle without peer.

For information on how your company can increase the efficiency of its operations offshore, or anywhere, with transport helicopters, write us your company letterhead or call today to General Manager, Sikorsky Aircraft, Bridgeport, Connecticut.



4. CONVERTED art with flight deck aft easily accommodates the Sikorsky helicopter. Men and more ships and rigs are being converted with much helicots. The helicopters eliminate the need—and cost—of standby safety boats at drilling rigs.



5. PASSENGERS alight after safe, easy flight. The helicopter makes up another of required stops each day, landing in steady flow of passengers in each direction between several rigs and the mainland.



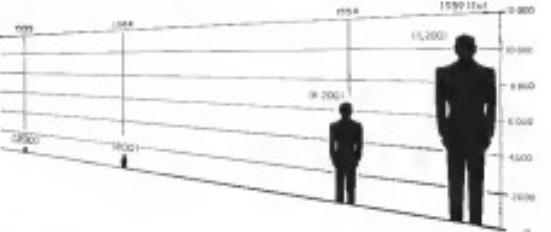
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AVIONICS

Airframe firms' employment of avionics engineers will nearly double in next five years as . . .



Battle Over Avionics Dollar Sharpens

By Phillip Klein

The established avionics industry, already reeling into increased competition from its own expanded ranks, fears the prospect of even more competition from new entrants such as Icarus, particularly on the West Coast. Yet the entrance of new challenge remains open to competition.

Within the past few months, beginning systems manufacturers have often found themselves as direct competitors with aircraft firms. In one instance, North American Aviation has cast the field to get a contract to purchase the fire control system for a new McDonnell all-weather attack fighter. *Aerospace Week*, Nov. 6, 1973, p. VI.

Similarly, Radio Corporation of America, after a major avionics producer, is a subcontractor to NASA on a portion of the system.

In the field of missiles, where avionics components are steadily driving a much higher percentage of the revenue seek themselves, there is much greater cause for concern, according to the spokesman for one large avionics firm. □

Up and Going Higher—It was hard to find the basis for the new competition. Aircraft manufacturers now employ more than 6,200 avionics engineers, a figure expected to top 11,000 in five years, according to an extensive *Aerospace Week* survey reported here last week. More than one-third of these engineers are engaged in in-house avionics research and development, the survey indicates.

The trend toward giving aircraft man-

ufacturers more responsibility for avionics system design, procurement, and integration, which has been called back-to-back, the prospect of even more competition from new entrants such as Icarus, particularly on the West Coast. Yet the entrance of new challenge remains open to competition.

■ **Triple Threat**—The challenge to the established avionics industry comes on three fronts:

- Systems engineering
- Equipment fabrication
- New competitive devices coming out of defense R&D activities

Systems engineering traditionally has been the responsibility of the larger avionics manufacturer, a responsibility which many of them believe they must hold to assure proper system performance.

Typifying competitive threat posed by airframes



CONVAIR

systems engineering responsibility is not in itself a significant source of income to such a manufacturer. However, it enables him to specify his own components which are exclusively designed for compatibility, and usually at his own manufacture. Fabrication of these components and subassemblies is the major source of his income.

■ **Fire-Bee "W-H" Success**—Avionics manufacturers like ever more and more of the software engineering for the design of their systems, guidance and fire control systems. Many avionics manufacturers may start fire control of getting the right part for the right price, the right part for all portions of the system. This is the case if the software starts before linking a fire control system for example decides to put out individual spots for the radio, the area price, and the cockpit.

It is addition, small companies set up to manufacture avionics subassemblies in some line have already done so at least a pilot-line basis, the thrust is compounded for the large avionics manufacturer because it means of course the cost rises, the cost price, and the cockpit.

■ **North American** as an outgrowth of aircraft sales point out:

• Aircraft sales, developed by Convair for a private aviation contractor, is now in joint production.

• Fire control systems, including radar, computer, and target, developed and licensed by Glenn L. Martin.

• Aircraft landing systems for carrier-based aircraft and subsonic transports developed by Bell Aerospace Co.

• VHF communications set and intercom set developed by North American's Electronics group.

• Guidance cathode ray tube, developed by Convair, and now being produced for the space program by Martin. *Aerospace Week*, Nov. 12, p. 71.

There also have been recent announcements of developments in the aerospace subcontractors and data com-

panies to established avionics manufacturers are these scenes at . . .



NORTH AMERICAN AVIATION



GLEN L. MARTIN

plaints field by Boeing, Convair, Convair, NASA, and others. There could undoubtedly be many more disclosures of new avionics developments if it were not for security, since most of the avionics industry's money R&D goes into missile programs (45% for missile research and development).

■ **How It Started**—It is doubtful if any of the missile manufacturers, excepting perhaps Lockheed, originally planned the avionics field with the idea of profitably developing. Most of them got into the field after the war as a result of missile contracts which involved considerable avionics work for navigation and control.

The missile field was in new that was first, if any, valuable subassembly or major components available from missile manufacturers at off-the-shelf prices. This, coupled with the need for very close integration of missile avionics, procurement and assembly, prompted various missile contractors to start originally assigned only to do what integrators work has been handed out into house development.

Shortly afterward, the number and complexity of avionics equipment used in piloted aircraft began to increase, and with it the need for integrating off-the-shelf equipment and software into an effective weapons system. This added impetus to the trend which the missile program had started.

■ **Todays Philosophy**—The Glenn L. Martin Co. probably speaks for a sizable portion of the avionics industry when it says up its operating philosophy this way:

"Martin's basic belief is that the

How Much Drag in a Millstone?

In the highly technical air-world of today, the lack of facilities or "tools of the trade"—wind tunnels, physical and research laboratories, electronic devices, . . . is a millstone—an unnecessary drag on your engineering career.

Our physical test laboratory is just one part of a \$20 million facilities program designed to eliminate such millstones and to provide engineers with a chance to apply their abilities to their best advantage.

Engineers suffering from the drag of routine assignments and lack of proper facilities are welcomed to discuss with us the opportunities for professional growth and advancement available at McDonnell.

Currently needed are aerodynamicists, thermodynamicists, designers, stress engineers, dynamics, flight test engineers, missile electronic engineers, industrial illustrators and artists. For further information, write:

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but overall aerosonic system will result when the electronic equipment is designed by electronic engineers working side by side with other engineers of the aircraft technical staff. The creation of the electronic design office (at MacDonnell) further emphasizes the recognition of electronics as one of the basic sciences contributing to the development of tomorrow's products."

Industry Concerns—It is likely that you have seen news items more recently of the various accidents last year after the USAF test maneuvered its Weapons Systems Management Plan, which went awry would add to the aircraft "unreliability" written above.

Since then, there have been comments (AF Reg 70-5), plus numerous statements from USAF officials, such as that of Brig. Gen. Thaddeus B. Wood of the Air Research & Development Command:

Speaking in New York last spring, Wood said: "One of the basic tenets of Air Force policy . . . is to avoid building up, at public expense, a capacity on the part of the weapons system industry to compete unfairly with other established industry." *Aerospace Week* Mar. 28, p. 42.

However, the air force's short aircraft manufacturer building up aerospace capabilities at that time appears to compete on even terms, or to handle various engineering problems on missile programs. The latter can apparently serve to teach an aeronautic manufacturer to live more honorably, as it has been taught. One North American, and probably others:

• **Boeing Aircraft Group** at Seattle-Renton, whose present annual backlog runs to \$5 billion, is an excellent example of how the development of a new or improved technique for a missile program enables a company to get as far in the aeronautics door. Ryan's hacking methods, for example:

- Automatic navigation computers.
- Missile guidance.
- Helicopter hovering control for anti-submarine warfare use.

Boeing got off scot-free in the aeronautics field about five years ago as a result of guidance techniques developed primarily for its new fighter F-105 Thunderchief missile. Because of recent legislation, Owen Dahl, chief of Ryan's aerospace group, now says that that was "an old technique made perfect by new laws here." This is believed to refer to improvements in Dugay-type solenoids.

By applying these techniques to a dangerous competitor like guided aircraft, Boeing has come up with a completely self-contained device which supports given weight, a continuous rotation of the missile and longitudinal and enables him to fly to near per-

FLIGHT TEST FILMS OF NEW DUAL PISTON EJECTOR

Plane: North American F-100

Place: Edwards Air Base

Date: June 10, 1963

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TOMORROW'S AIRCRAFT: One step closer

Air Arm Systems "package engineered" for installation and maintenance



Quicker installation and easier maintenance . . . important plus-factors for airborne electronics equipment are a reality at Air Arm. The basic Air Arm approach to all electronic problems, combined with inherent ingenuity and capability, has led to concepts such as pallet packaging, encapsulated and functional circuitry, built-in test points . . . to mention just a few.

Applying these concepts to all Air Arm systems gives outstanding features . . .

- 100% accessibility → compatibility with aerodynamic design
- weight and space reduction → self-contained shock isolation
- simplified airframe design and construction

MACAMPS, potted units and other proven developments for weight and size reductions are a basic part of the new packaging concepts. Electronic circuits are physically combined and integrated into compact subassemblies—each of which has a single major function. These overall packages are made up of functional units of complete systems.

This "package-engineering" results from intense Air Arm development and close Air Arm association with the special problems of airframe design and operational requirements. Such achievement in electro-mechanical design are typical of Air Arm's efforts to bring simplicity and increased reliability into airborne systems, thus bringing tomorrow's aircraft—One Step Closer. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 168, Pittsburgh 30, Pennsylvania.

34095



MACAMPS typify the "package-engineering" which Air Arm applies to airborne systems. Simple and reliable in construction and compact, they are a natural replacement for vacuum tubes. Whatever such packages as used, whether multi-unit packages or one, the basic idea is to reduce circuitry to minimum and systems are far more dependable.

The most advanced state-of-the-art is always brought to bear in Westinghouse design, evaluation and improvement of airborne systems. For example, human engineering studies help system designers to take quickly into account and understand better the greatest amount of dependability upon the system.

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reliable and reliable for its entire fleet.

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SPARK PLUGS

The R-115 and R-115-1 are just two of Champion's many types of aircraft spark plugs.

dependable with good warranty. (The latter possibly is a deadlocking component which stores draft information automatically from a Doppler radar.)

An early model of the auto navigation equipment was developed by the Navy several years ago. Kras is currently a research engineer with the company's mobile unit which will be completed next year. Old expects it to employ equipment made by his systems manufacturer. An F-104 is also indicated and has obtained a test for evaluation.

► From Navigation to Hovering—Singer's helicopter hovering control, which Old says "enables other very important functions during hovering," is another outgrowth of the Firebird guidance techniques. The company originally started the development with its own funds but is now seeking under Navy contract.

The experimental equipment has been given preliminary tests with more to follow.

► Aviation Cases at Convair—Of the 800 engineers which Convair is sending to its current engineering staff expansion program half are for avionics work, according to C. E. McCabe, manager chief engineer in charge of electronics at San Diego. McCabe won't say the reason for Convair's large avionic expansion this way, if an exclusive source factor would continue to be a prime motivator in future weapons systems, or if most get into avionic R&D.

The company is particularly anxious to expand its avionic capability so analog and digital computers, for applications such as fire control, can compete with more mature tools, McCabe says. Lack of such capability prevented the company from building a super spa-

tion jet for which it is now building only the nacelle.

At San Diego, the company currently has three important avionic programs, all Convair-coded, according to McCabe:

- Missile tracking and guidance

- Aircraft navigation

- Airborne search radar

Most of this work is for USAF, most of it as a subcontractor to another firm. One program at San Diego is

► Bus vs. Bus—As the systems industry sees some aircraft commercializing small-scale avionic production, and more of them making money by system engineering, it wonders whether the original people will eventually attempt to build most or all of the equipment themselves. Asked about this possibility, several company representatives reacted in terms which suggest that the answer is no, and are anxious about what the future holds.

For instance, at Rock the guiding philosophy is to set the best source for the particular job. For its avionics program from frame to nose cone of the new classed sealing connector elements, but the company name of the "pace electronic" itself, Rock had considerable work in negotiations, development, series test and validation, including documentation, Old says. To bridge the gap between R&D and production, Rock has hired engineers with manufacturing know-how from General Electric and other established aerospace firms.

Convair-San Diego is in addition to developing "pace electronics," now also building radar interceptors, precision electro-mechanical devices which were previously purchased from an avionic manufacturer. The reason, according to McCabe, is that Convair was dissatisfied with the quality and delivery of production interceptors supplied by that outside vendor.

McCabe speculates that the avionics supplier was driving off-line avionic subcontractors by going through a higher priority on design tasks. It is the subcontractor who is usually the one whose avionic manufacturer may encourage it to go to local sites the avionics house does not. It was also evident that the various avionic companies are going into the avionics business themselves.

► Philosophies Elsewhere—At Northrop, which has an important USAF missile program, a spokesman says the company intends to manufacture avionic equipment in one own shop, subcontracting certain components as one engineer leads on to others who can hold to our specification." The sole job shop they augmenter used to do the F-108 often as example. Northrop designed the system, then formed out the manufacture of each of the hardware to Mississippi-Rousseau.

Martin reportedly builds practically

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all of the avionic equipment used in the B-51 Matador missile, including ground-hand guides, a representative 60-ft Avionics Wing. The company has designed and built a complete fire control system, presumably for heavier bombers.

At Bell Aircraft, approximately 60-70% of the avionic equipment used in the B-51 Matador missile is being fabricated within the company, a significant test. He also reports that Bell is looking around for another work which it might take on for a joint contractor.

► Major Threat on West Coast—

Air competition from the defense industry is largely centered on the West Coast, in such firms as Convair, North American, Northrop and Boeing. Martin and Bell are the principal Eastern strengths. In contrast, companies such as Convair, Republic, and McDonnell seem to be more intent to stick with their traditional responsibilities, although they consider themselves primarily for integrating aircraft with their customers.

This was confirmed to Aviation Week by the findings of a permanent committee established to survey the aircraft industry to determine which companies were planning to design their own automatic flight control systems rather than purchase them from supplier manufacturers.

There are a few stories in the wind to suggest that some avionic-modified aircraft manufacturers continue sales of moving outside the military electronic field. Convair, for instance, has an avionics division based in San Diego, Calif., which is "exploring possibilities outside the government-contracted, military field."

► Considering Future—These

are unusual corporate factors which appear likely to set as a continuing force on the movement of the aircraft electronics industry into the avionics manufacturing field.

These factors, and steps which more established avionics manufacturers are taking as far as shifting to cover the present trend, will be discussed at the final article of this month.

that goes under a background sphere posted so as to clearly differentiate between earth and sky (patch down or patch up attitude). New type MM-1 VGI uses a sonic gyro and is available in either a 5- or 10-in diameter case.

► Available Electronic Parts—A new publication, Electronic and Electronic Apparatus, PB 117-463, lists about 13,000 government-specified parts of the electronic/electrical field, most of which are available for license on a royalty-free basis. Publication, priced at \$1.65, may be obtained from Office of Technical Services, U.S. Dept. of Commerce, Room 8227, Washington 25, D.C.

► Edition Beta 40—Dragon Aircraft has contracted with Litton Industries to develop an advanced digital computer employing a technique developed by Litton's Fixed State, which includes sort, search, and sort by a factor of 10 or more (Aviation Week Oct. 18, p. 62). Litton reportedly was out over 10 computers that had submitted bids in the job.

► Four SPARKS Delivered—Lab for Electronics has delivered four prototype models of its tape partition approach reader (SPARK) to USAF's Air Proving Ground, Eglin AFB, and Research & Development Center. First proto-type was demonstrated this spring (Aviation Week May 5, p. 54).

► Continuous-Level Read-Head—Modular tape reader head for tape recorders which provides continuous output regardless of tape velocity can be made from conventional magnetic recording heads by a simple modification developed by a simple modification developed by Analytical Research Foundation. Continuous-level output feature makes device useful for tape-rate changing and previous unknown signal decoding applications and intermittent stops of tape type.

Avionics Bulletins

New technical bulletins and catalogs of interest to persons in the avionics field include the following:

► New VDR Equipment Bought—General Airlines and Trans-Texas Airways have recently purchased Collins 51R-1 VDR equipment for Seattle maintenance. Central Airlines also purchased Collins 1744-1 VDR transmitters and 51X-1 360-channel VHF receivers.

► New VGI for PHE—McDonnell Aircraft has ordered for the PHE nine that a million dollars worth of new Lear Ven-

ture products derived to check orientation and motion sensations and their effects on the body. Waltham, Mass., manufacturer of motion simulators.

► Avionics system standards—more than a dozen different types of status and performance test standards are described in 15-page Bulletin 1000, available from the Defense Communications Agency, Washington, D.C.

► Possible source catalog—Metal Foil with various thicknesses, 1/2 in. to 1/16 in., will be available to 1/16 in. for both the 1000 and 1000A series of aircraft and space vehicles. Laddona Electronics Corp., 1101 North Northern Blvd., Glendale 41, N.Y.

► Pressure gear catalog—A catalog of pressure gear, valves, pumps and accessories is in press. Pressure Controls Inc., 1180 36th Street, Brooklyn, N.Y.

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Douglas B-66 takes off at Long Beach, California, for its first run. Its electrical system was designed by G-E engineers to deliver rated load with 10°C cooling air.

GENERAL ELECTRIC



Side view of bomber shows sleek lines. It is first production aircraft to have an elevated ambient temperature in a electric system.

Latest Air Force bomber has new G-E engineered power-generating electric system

NEW GENERAL ELECTRIC ENGINEERED SYSTEM MEETS DOUGLAS B-66 OPERATIONAL DEMANDS FOR HIGHER AMBIENT TEMPERATURES

A new air electric power generating system has been developed by General Electric, and is now operating on the Air Force's newest light bomber, the Douglas B-66. The system consists of three major components: high-efficiency alternator, static voltage regulator, and generator control and protective panel.

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With a generator that can operate at high ambient temperatures of high speed flight, the new G-E system is designed for long life and reduced maintenance time. Its static voltage regulator has no moving components to wear out, and static laboratory testing it has withstood 2000 hours of operation without failure.

Regulation is precise, and requires no pilot adjustment of voltage or load division. The control panel regulates the automatic control of startup, shut down, and shutdown.

potentia against ground fault, over and under voltage, and open phase.

SPHERES TAKE-OFF, SPARES PILOT

The new system requires high operating as soon as the pilot starts the engine. The system contains only two torque switches, which may cause "on" at all times, even when a fault develops. This eliminates a series of pilot functions and simply reduces the time required to become airborne. Under normal conditions, start, clearing and resetting are fully automatic.

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General Electric offers a single source for complete air electric power generating systems, including speed drive for motor-generator sets. For more information, contact your nearest G-E service representative, or write Section 200-02, General Electric Company, Schenectady 1, N. Y.

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supply includes a 1,500 cu. in. receiver. High pressure air is used to fill the air tanks as required, service tanks and lines.

- **Pneumatic power.** Low pressure—50 psi at 130 ft./min. at 65°F. Low pressure air is used to start aircraft equipped with pneumatic engine starters and drive the seat's ejection control equipment. A compact Allis-Chalmers gas turbine supplies the low-pressure air. It develops maximum output at 14,000 rpm.

- **Refrigeration.** An electric refrigeration machine provides 50 D. min. air flow, 1,500 ft. cu., at 10°F. Air flows at 10°F. A modulating valve keeps air at any desired temperature within the operating limits of the machine. Refrigerated air cools a plane's cockpit and electronic components while ship's air on the ground. The refrigeration machine is a modification of a standard B-47 cooling unit.

▪ **Emergency power.** At 10,000 ft. (transient) it has a 100,000 lb. surge load.

Model 1000 is powered by a 165 hp Ford V-8 engine and has a 100 ft. 3 in. diameter. It incorporates a torque converter and has two forward speeds and one reverse.

▪ **Model 3000.** Completely electrical, it and its power supply cables in the Model 1000 are 10 ft. long and are stored in the storage unit. Cables are provided with "Chicago lock-on" type fittings at the end and which mechanically lock the cables to the aircraft's frame. This is so cables won't be torn out by the roots if someone accidentally drives the vehicle off without disconnecting it from the aircraft being tested.

Both rear wheels and four-wheel drive provide maximum traction when not in need to tow heavy aircraft and allow it to maneuver through trees and mud.

All components are easy to remove and replace, simplifying maintenance of the unit.

Analog components built into the unit see no oil interval and coated paint for the gas saline. Wires are connected to the switch, and high-pressure air connection to the control panel.

▪ **Model 5000.** Pneumatic panel of the Model 1000 is in the Model 5000 a single-pressure ground serving unit. The 100 ft. 3 in. diameter for the Model 5000 is 99 ft. 6 in. The unit also supplied 675 square-foot ground support equipment (Model NC-51 to NC-51).

This is what the Model 5000 can supply in the way of power:

- A.C. power—60 kw. at 115/230 v., three phase, 500 cycle.
- D.C. power—38.5 v., up to 2,150 amp.

- **Pneumatic power.** Up to 5,000 psi, an oil cooler is incorporated in the hydraulic power supply system.

▪ **Pneumatic power.** Up to 3,500 psi, at 13.5 cu. in. pressure is provided in the pneumatic system.

- **Ejection.** Machine is capable of towing aircraft weighing up to 65,000 lb. The Model 5000 is powered by a Ford V-8 engine. It has a free-wheel drive and comes either with a mechanical transmission or a torque converter. The cockpit has a landing distance of 18 ft.

- **Brakes.** Steelies—Here are some of the highlights of the aircraft to detail pad for Case-hardened Steel engineers to the Model 5000.

- **Engines.** exhaust is at cabin-top level to prevent heat or sparks from igniting fuel pedigree on a ramp.

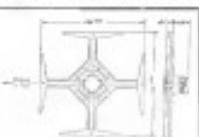
- **Headlight.** lights have been provided here and off in mind decreasing night vision of pilots working in planes around which the vehicle is moving. Lights that make the machine ready for service under combat conditions.

- **Exhaust.** the nozzle of the aircraft provides housing and tie-down attachment points.

- **Shave pliers.** is located on right side of the vehicle so that vehicle power can be plugged into the unit as one own power source.

- **Front deck.** front control panel is strong enough to hold several men thus providing a platform for them to stand on to reach high up on an airplane.

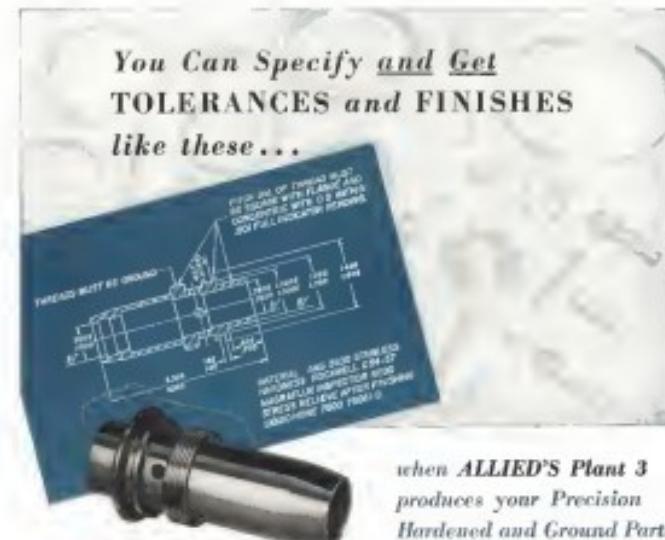
- **Tail gate.** is built to accommodate the



New Flush Antenna

This engineering drawing is of the LPS-730, the flush-mounted loop antenna recently released to production by Resonant Radar. The antenna, which mounts horizontally, will be used with Resonant ADP controls. It will work equally well with existing equipment in the field or with new equipment coming out next month (such as the Brooks ADP-10), says the company. The basic structure is built up from the center of the base and is made of a special ferite composition. It is the composition that brings out the ends of the collective bars. Purpose of the latter is to convert for quad signal waves produced by the antenna. On the Vukor-Ventron installation, ends of the composite bars had to be curved to avoid hitting the antenna in 40 miles per hour wind speed. Vukor allowed it the clearance.

This is the third major design change made to the antenna before it was released to production.



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A **16-Page Brochure** describes and pictures in detail the facilities of Plant 3, where Allied produces precision hardened and ground parts held to a complete listing of all equipment in use. A copy will be sent you immediately upon request with full information.

ALLIED PRODUCTS CORPORATION

DEPT. D-20 12637 BURT ROAD DETROIT 33, MICHIGAN



10-ft long electrical power boom quickly as the vehicle moves from one plane to another.

* Large windows have been provided all around gunnery, navigation visibility to avoid collision with trench. Windows in the top bulkhead shielding wing clearance easy. Windshield wipers have been installed on front and rear nose doors.

* Unit has spotlight with 360-degree, swivel, large fire extinguisher, low level on the rear.

► Company History—Consolidated Thermal Electric Corp was formed in 1942 by Schaffner and a partner. Principal work was producing magnetogenerator

sets for the atomic tanks.

In 1947 Schaffner bought out his partner and became president of the company. Shortly thereafter he won a contract from the Navy for the NG-5 self-propelled gun.

In the fiscal year ending July 31, 1953, Consolidated Diesel did a business of under \$800,000. This grew to \$4.5 million in 1952, while 1953 saw the firm's business pass the \$5-million mark. In 1954, volume exceeded \$10 million and sufficient backlog exists to assure a 1955 sales volume figure of approximately \$20 million. Schaffner says:

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parts are gasoline and diesel engines, drawn air, and dc generators with power outputs ranging from 5 kw to 300 kw. In addition, mass-produced self-propelled magnetic airport and runway sweepers, guided missile launching and recovery equipment, and engine-driven floodlight units.

OFF THE LINE

Contract to modify and upgrade 32 C-47s has been awarded by Boeing to contractor's Clinton Goldsmith Division. The contract is under the Air Force's SLAN (Inoperable and Repair at Remanufacture) program. PAC is currently upgrading and repairing 123 C-47s and C-117 aircraft for the Air Force, the company states. . . . A \$300,000 contract to modify Air Force RB-57s has been awarded to Avantair Engineering & Maintenance Co., Wichita, which will be performed at the company's Oklahoma City base. The modification includes extensive cabin modifications to 13 aircraft to equip them for specialized missions. AFMCO, a subsidiary of Transamerica Air Lines, a private investing and managing firm, is involved in maintaining T-33 and F-100 aircraft and in-vation ground units for USAF. Company has a 50-year history.

Overhaul period of Pratt & Whitney Wasp Major has been extended from 1,000 hours to 1,200 hours by the Third Air Transport Squadron, Brooklyn AFB, N.Y., accorded via P&WA. The engine can now be installed on Douglas C-114 Globemaster III aircraft.

New heating exhaust repair kit to repair jettison stores SS-A-92 combustion heater has been put on the market by Sheldahl Tool and Engineering Co., Inc., St. Paul, Minn. The repair kit is offered especially by a major number of heat exchangers to be repaired at a fraction of the cost of a new heater and prolongs the heater's life several times. Address: 1045 South Randy Drive, Los Angeles 90025.

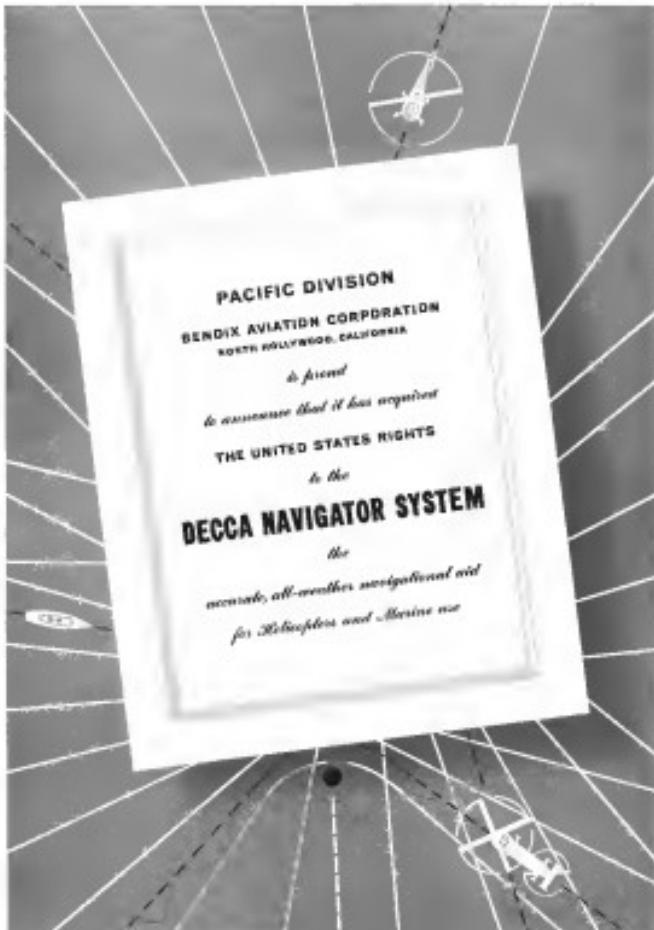
Bethesda's fast-expanding turbosupercharged Bettisford Interceptor will use Muntzmet's new low-temperature, fast-reactant hydroxide fuel, Styrel 993, according to published sources. . . . A new booklet on Styrel is available from Muntz Chemical Co.'s Organic Chemicals Division, St. Louis 6, Mo.

Nevco, Inc. has announced with a new catalog the introduction of a new drop which gives it an additional 13,000 sq ft B on the premises of its present warehouse at Lambert Field, St. Louis. The company is a distributor of aircraft parts, robes and supplies for extra aircraft

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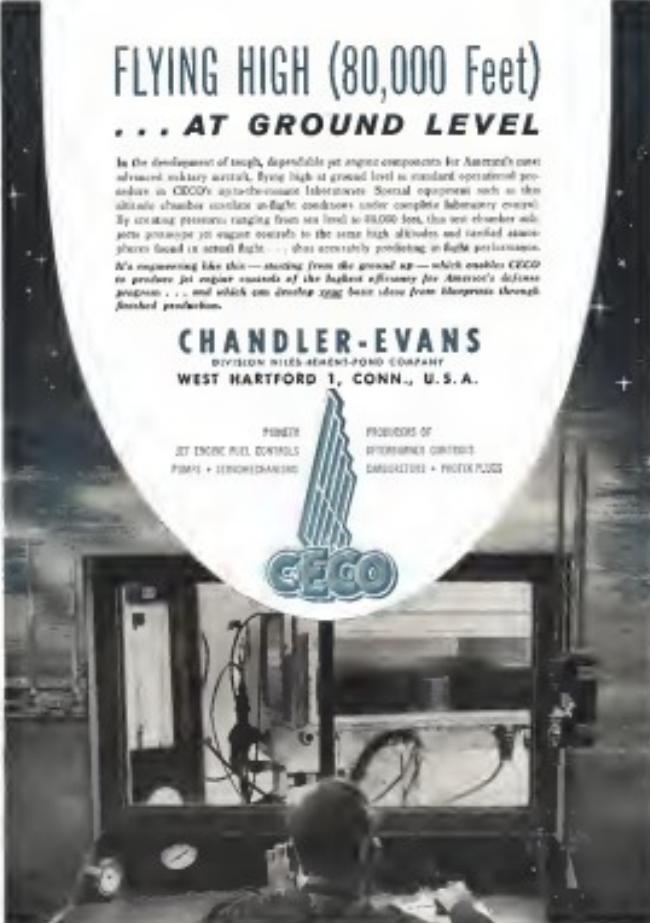
In the development of tough, dependable jet engine components for America's most advanced military aircraft, flying high at ground level is standard operational procedure at CECO—again-the-source. Special equipment such as this altitude chamber simulates flight conditions under complete laboratory control. By creating pressures ranging from sea level to 80,000 feet, this test chamber subjects prototype jet engine controls to the same high altitudes and varied atmospheres found in actual flight... thus accurately predicting in-flight performance. It's engineering like this—starting from the ground up—which enables CECO to produce jet engine controls of the highest efficiency for America's defense program... and which can develop your basic ideas from blueprints through finished production.

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OVERSEAS SPOTLIGHT

Italy's Share of Offshore

Italian industry received U.S. oil shale processing equipment for more than \$45 million worth of contracts, plus in the three years from July 1953 to July 1956. In addition, orders were given for some 531 oilfields worth of electrical equipment, worth \$100 million, for aviation and auto-motive uses. Among the contractors:

- Ansaldo, Reggiane P.84 parts, \$10,833,746
- Fiat, Alfa Romeo 133 turboprop parts, \$9,129,114, assembling North American F.86s, \$32,500,000
- Fiat-Marelli, instruments, \$59,565
- Fiat, takeoff assist rockets, \$1,357,757
- Piaggio, carburetor of aircraft engines, \$1,830
- Fiat-Marelli, overheat of aircraft engines, \$140,930

Miles Studies French Wing

Ford-Delton is building a high-expansion wing for test at the Miles Aircraft light empennage, similar to the wing which has enabled the 31D 31 to every greater speeds and air show success in conventional transports.

French sources say the British government is interested in the progress of this project.

Fiat in Trouble

The Fiat company has dismissed 370 workers employed at its aircraft division, Astiello, Italy.

According to the Italian press, this confirms reports of a serious strike at Fiat Astiello and Hirto. Engine shops, due to lack of sufficient orders, the company is said to be considering winding up its aeronautic department.

Canadair Picks U. S. Bond

Canadair, Ltd., has decided to use an American adhesive—Monsanto's 3M-47—in bonding applications on the CL 25, Canadian transonic research version of the Sabreline which it is building under license from British

The British makes extensive use of adhesive bonding in its aircraft (Aviation Week June 7, p. 40). As far as Canada is concerned, the British process of Resin bonding is used. Canada is an American supplier of bonding for supply sources on the North American market, but it has occasioned disappointment in the British aircraft industry, observers state.



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NEW AVIATION PRODUCTS



TANK-TRIP trailer unit behind one of 317,000 fueling trucks at Islip Airport.

Fuel Filter Traps Water, Fine Dirt

Now another fuel filter, manufactured by Poulson Products, Inc., is being introduced at numerous commercial airports. One of the principal partners of the company is Alfred Aviation Fueling of New York, Inc., which is installing the Poulson units in its mobile fueling equipment used at New York's Intrepid Airport and at Fort Worth's Army Airfield.

Alfred standard equipment at some USAP fields and supply bases, the II line consists of various sizes ranging in capacity from 30 to 1,200 gpm.

Units used by Alfred are the Poulson II-B tank type. These consist of Poulson accordian-plated, mini-irrigated, pleated paper elements with a total filtration area of 10,200 sq. in. These elements filter out all solid particles remaining down to 10 microns. At least 99% of all entrained water is also removed, according to Poulson.

► **Water Trap.** The II-B unit also has a built-in trap containing automatic water dump valve. When a certain amount of water has collected in the trap, an automatic switch stops the flow of produce until the excess water has been completely drained off; at which point fuel flow is automatically resumed.

The II-B units have a capacity of 300 gpm with a 21 lb. pressure drop. They are 5 ft. high and 25 in. in diameter.

At Islip airport, Alfred uses the II-B units on new \$17,000 fuel tanks. On these tanks, the filter, as well as

striker arm, weak or broken, will fail. It will extend and retract 56 in. and can carry 6,000 lb. with a pitch up to 45°.

Since the mast and fork are integral parts of the truck, and are not attachable, distortion and sagging and the resulting extra wear and tear and cost are avoided, the manufacturer claims.

Using the ESHR, operators can right-angle park on a 5-ft. wide site with a 36-in. load. Load-hauling, corner gridding, roll-over forward and reverse, left-left, extension and retraction. The vehicle has a standard load lift of 170 in. with 83 in. front. Maximum load size was 10,000 lb. without changing track dimensions to a 6 MECH-13 in. FADRS.

► UNIC-TRIP

The vehicle will enough to tow trailers of 31 to 122 cu. ft. from distance according to Alphonse, covering some factory units. A bidirectional operating system for operating the pump, which extracts 10 cu. in. before the pump begins to run, is built into the unit, located in the trailer and has been tested. An issue is the weight of the trailer exists a predetermined pressure on the bar, it automatically releases, closing the trailer tightly to the trailer's body plates.

Strain-free, the fuel tank at the choker end of the trailer are swivelized and the outrigger wheels lowered. Fixed wheels are used when the Uni-Crop is unloaded, raised when when the load is being pulled. The entire operation takes a couple of seconds and is done by pressing a button on the operator's console. Maximum trailer load is 8,000 lb.

► **Catamaran.** Ram-6, U-shaped carts have long runs, the first of six land developed, the manufacturer states, is the distance that gives the closest full sight control of his vehicle when loaded.

The controller is part of the radio-trail truck on which the fork or sign is used and lowered. Previously controllers were made of one solid plate having visibility. In the new design, the center of the plate is cut out. This hollowed-out unit is available on all of the company's Ram-6 units.

► **American Transportation Co.** 349 W. 47th St., Chicago 20, Illinois.

► **Studebaker.** The ESHR. 1100-tractor

UNIC-TRIP TRACTOR complete to trailer.



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CLUTCH takes long periods of slip

Miniature Slip Clutch For Guided Missiles

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The clutches are designed for long periods of slip without slowing the slip frequency. Their surfaces are small, yet are set to be made possible by the new design feature in the inner set of isolating parts as the housing can rotate between driving and driven members, so the outer arm set of the principle of employing spring action.

Roton Metal Products, Inc., 1101 Lawrence St., Brooklyn 8, N.Y.

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AVIATION WEEK FEATURE ENGINEERING ARTICLE

"DC-7C CHALLENGES TURBINE TRANSPORTS"

This highly informative technical article is typical of the outstanding engineering reporting made available to AVIATION WEEK subscribers... by the largest and most highly skilled staff of graduate engineer-editors serving any aviation publication. In this case the story was written by David A. Anderson, Senior Engineering Editor, whose biography appears in this advertisement.

In this fast-moving aviation business, engineers and management now want to get their engineering information delivered to them while it is still news, not months later. They need this information to make daily decisions affecting the defense of the nation and the well-being and progress of the country's largest single business - aviation. These men have learned long ago that it is only through the fast AVIATION WEEK publishing schedule that these important requirements can be met.

DAVID A. ANDERSON, SENIOR EDITOR
Engineering Editor, holds a Bachelor of Science in Engineering from the Worcester Polytechnic Institute, and has completed advanced post-graduate studies at Princeton University and Massachusetts Institute of Technology. He is Vice President of Engineering Department of Pan American World Airways. Mr. Anderson has been a member of the Society of Experimental Test Pilots and American Federal Engineering Association. He also is a products committee member on more than 20 of the 100+ industry bodies. Member of American, the American Society of Mechanical Engineers, and the American Institute of Aeronautics and Astronautics. Member of General Motors Corp., as well as several professional and aerospace organizations in America and abroad. He is a member of the Royal Aero Club of Great Britain, Royal Aeronautical Society, and Royal Society of Engineers. Member of the Royal Society of Engineers, Royal Aeronautical Society, and Royal Society of Engineers. Member of the Royal Society of Engineers, Royal Aeronautical Society, and Royal Society of Engineers. Member of the Royal Society of Engineers, Royal Aeronautical Society, and Royal Society of Engineers.

Mr. Anderson joined the General Motors Company in 1946, as an engineer in the Research Department. During his first 18 months and 10 days he worked there as a participating fellow for a long range radar project. He was then assigned to British Engines at M.I.T. Research Laboratory, Cambridge, Mass., where he was involved in design and development of the first British built Rolls-Royce Dart Turbine. After returning to work on the famous piston airframes, joined the aircraft staff at AVIATION WEEK.



Mr. Anderson is a member of the Institute of the Aerospace Engineers, Society of Automotive Engineers, Federal Trade Commission, National Research Commission, Consulting Council, and American Wings Association.



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United's prior equity increased to about 2.5 million shares at present. The larger number of shares outstanding is a factor to be considered in reviewing prior statements.

The wide extremes occurring between plant gain quotations and present market prices for some of the airline options does not mean that price parity has been lost; the name means to us "comparative." **Eastern and American** • **Water and High Water:** The high water marks of eight and nine years ago were just that—quotations of the day contained considerable write-in in the indiscriminate hopes and expectations and rate the future mobility by financial speculation.

Little regard was accorded a realistic measure of earnings to be attained by the industry prior earnings after from 20 to 30 were not uncommon. There was no disposition to view the mid-valued positions more seriously and the lack of other elements which determine value reflected with very particular disengagement.

The passage of time tended to encumber of those prior depositions. Many investors today, for example, realize the importance of the difference in a sub-add-free carrier from one that is still dependent upon the government for support. (This is being set to the failure of local-serve airline companies to participate in the recent market boom for transport services.)

Also, many investors have a disposition to inquire as to whether management traffic deserves competitive performance, the intent of equities, etc.

► **Barber and Colman:** There is considerable difficulty in airline operations. A wide variance of operating costs does not readily permit material offsets in periods of declining business. Further, in many cases the measure of debt imposes relatively high fixed charges on the operating systems of the industry. It is these factors which may introduce major elements of instability on airline operations, i.e., traffic declines leading to rapidly cutting schedules.

It was a reflection of this condition that later date airline equities to their all-time low, generally established in the 1948-1949 period.

Very recently a condition inherent in the industry factor, however, may come to mount very rapidly damage panels of using traffic volumes. Once a broken record is reached, the equal portion of all additional revenues generally flows through in net.

The volatile character of airline earnings and the continuing advertising operations, introduce wide disparities in the market fluctuation of the industry's incomes. For this reason, relatives among the individual owners' returns of investment importance at a grade in investment—**Sell** Allotted.



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MOTORS

Brushless permanent magnet with adjustable torque, the BC-2000 is designed for aircraft applications such as high altitude, high pressure, and high temperature. It includes built-in current limit, thermal, and overrunning momentary features. Gear head versions offer wide selection of gear ratios.



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ELCTR-MECH RELAYS—Available in capacities from 50 amperes to 200 milliamps. Wide range of coils, no chokes, mounting details. Extensively used in fuselage landing brake circuits and in pilot cutout safety in electronic systems. New type IPV offers savings in circuit mounting space.

Since the early Thirties, Barber Colman Company has been designing and manufacturing materials specifically for aircraft applications.

Throughout the most important period in aviation's short history, Barber Colman engineers have closely cooperated with major aircraft and equipment manufacturers, the military, and oil leading airlines. As a result they have acquired a thorough and very broad knowledge of those factors in aircraft design which determine and limit the function, size, weight, and performance of necessary equipment.

Applications for Barber Colman aircraft controls range from those requiring no separate operation of complex or simplified systems... with either custom-engineered or standard type controls as required by the specific applications involved.

RYAN "FIREBEE"



TELEMETRY BY

RREP

Ryan Aerometric Company's spectacular remote-controlled, jet target plane, "Firebee," uses standard RREP telemetering components in flight tests at Holloman Air Development Center.

The telemeasuring equipment transmits, via FM/FM radio links, information on current altitude, velocity and airspeed profiles, engine speed, exhaust gas temperatures, etc., to the RREP ground telemetering station which receives and records the data.

Standard components such as the RREP Type 937 Voltage Controlled Oscillator Oscillator, Type 848-L RF Transmitter, and the Type 811 Dynamotor-Commutator-Gate are in constant use, providing the highest degree of performance and reliability.

Oscillators are uniquely rugged and of unique design preventing adverse heat distribution characteristics. The RF Transmitter affects the aircraft in stability of Temperature, Shock and Vibration under widely varying environmental conditions that characterize draw and missile service conditions. Multipurpose Dynamotor-Commutator-Gates provide long-life conduction, highly filtered power supply and precision electronic gating for absolute control of information pulse width.

Write or call for information on RREP's subcontractor telemeasuring components, new "UNERAC," a versatile, expandable subscriber-modulator receiving which includes voltage regulator and remote or remote calibration, crystal-controlled transmission and new RF amplifier. Technical bulletins are available upon request.

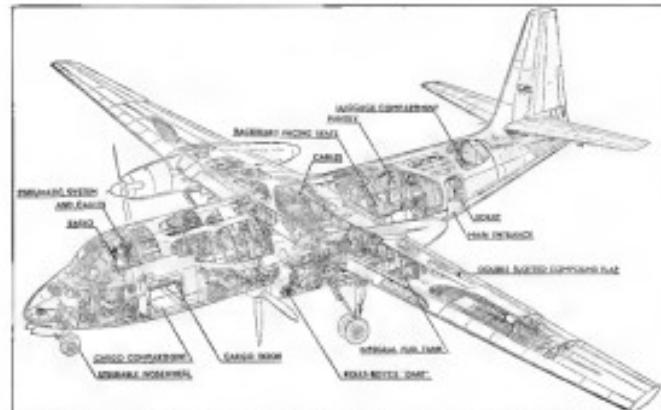


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AIR TRANSPORT



TURBOPROP FRIENDSHIP's luggage compartment, forward-facing seats and cargo compartments are shown in this cutaway.

Fairchild Survey Verdict:

F.27 Gains Favor as DC-3 Replacement

- * Aviation consultants report interest of local service airlines and trunks in turboprop-powered Friendship.
- * Fokker will push production of new shorthaul airliner; plans for U.S.-built version are likely to be speeded.

By Claude O. White

Plans of Fairchild Engine & Airplane Corp. to build the Fokker F.27 Friend ship, 28-passenger twin-turboprop transport, for the U.S. market have been stimulated in recent weeks by two developments:

* A market survey for Fairchild by Bar de Boer, Washington aviation consultants, has uncovered a promising market with good potential sales to local service airlines and smalllines plus the business travel field.

* Fokker Royal Netherlands Aircraft Factories, now building an F.27 prototype that will fly in May and be demonstrated in this country under Fairchild auspices before the end of 1964, will share with production at once with

agreement with Fokker to build the transport, powered by two Rolls-Royce Dart engines, and sell it to the entire Western Hemisphere—with the exception of Brazil (Aviation Week Sept. 4).

While statistical results of the Bay of Bengal survey cannot be made available, Avianex West has been press sent of the human as the local source at best perhaps that substrate a growing potential for a plane of the Friendship's type.

F.27 vs. B-737—Assuming all U.S. feeder lines were located to DC-3s, it takes considerable time, and the passenger rate will be about three times that of U.S. aircraft plants.

* Potential Growth—Fairchild's tentative plans to build the plane at its Hogsett, Md., plant won't start likely to proceed until greater space is made available as a result of the Fokker expansion and the Ray & Krey merger.

The U.S. company has a license

not writing for the flight test program.

Fokker's decision to push production plans substantially was based on the reality of its own survey covering sales potential in countries outside the U.S. In addition, the Fokker management is eager to take full advantage of its local assembly field.

Using the Netherlands plant will take considerable time, and the production rate will be about three times that of U.S. aircraft plants.

* Potential Growth—Fairchild's tentative plans to build the plane at its Hogsett, Md., plant won't start likely to proceed until greater space is made available as a result of the Fokker expansion and the Ray & Krey merger.

Projecting the figure rate 1964, if F.27s were used for extended local carrier traffic, the airline would need 300 planes flying 2,000 hrs. a day. With the F.27, passengers could be handled



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with 239 transports flying 1,177 hr. a day.

Even with a plan of the F-27 type available and accepted, the implement would not be complete, although some new equipment must be introduced because clearly there will not be 500 DC-3 available in 1968. According to CAA, November 1966, the number of public passenger seats for DC-3 operations, including aircraft not yet in service, was 1,966, while CAA was from 1966. The decline has been fairly regular since then, down to 331 in 1953, last year for which figures are available.

Fokker Operations—Third quarter figures published by Civil Aviation Board on local name traffic support indicate the continued progress in the field of air transport. Compared with the new period of 1953, the passenger load factor rate of all DC-3 operations is up from 43.51 to 51.64. The average number of passengers per flight increased from 41,016 to 45,920. Revenue passenger miles declined from 11,042,000 to 13,995,000.

In the case of Malawak Air Lines figures for the same quarter in 1953 and 1954 show an increase in load factor from 52.83 to 68.13, while the number of passengers carried increased from 47,188 to 68,377. Present Air Lines' load factor gained from 43.30 to 52.36 and passenger carried from 37,883 to 44,467.

Annual revenue figures for the third quarters of 1955 and 1956 also show increases in the load factor air lines. For all DC-3 operations, that rose from 54.24 cents a mile to 61.59 cents a mile. Malawak Air Lines load factor record in the period is not available.

Introduction of Vickersair Service by Central African Airlines is in continuation to date adoption by other carriers of the Rolls-Royce Dart turboprop engine, which will power both the Vickersair and the Friendship.

In the third quarter of 1954, Malawak's non-mail revenue fell only 1.55

cents a mile short of halving its operating expenses down from 27 cents in the same period last year.

Sabena-Fokker Interest in a transport of the Fokker Friendship-type-of development is certain to cause a serious problem for CAB. At least one airline, Panair, made a comment affecting its interest in DC-3s to the effect of possibly getting involved. The comment referred to a higher seat capacity than the 24 a leg, and indicated that Panair wanted to buy the old equipment, forcing the line to revert to the DC-3.

There is some feeling CAB may have to modify the rules before any local carrier can fit in to introduce a new and separate aircraft. There is no report yet that the airlines will do. For a straight aircraft is and should be supported a transport meeting higher operating costs than the DC-3. In fact, Fokker and Fokker figures show the F-27 will result in economies.

However, in the case of the DC-3 operators who purchase and use a nose strake, the economics probably will be similar to those existing against lower fares if "Fokker" appears.

F-27 Outboard-Offset features introduced by Fokker in its study of the outlook for the new turboprop-powered transport.

The Friendship will be an aircraft being used next. It will be possible to deliver a Fokker-built F-27 early in 1957.

Liaison certificates for local services will be approved. This would eradicate certain of revision and cost the problem of financing new aircraft.

Introduction of Vickersair Service by Central African Airlines is in continuation to date adoption by other carriers of the Rolls-Royce Dart turboprop engine, which will power both the Vickersair and the Friendship.

At least in the beginning, F-27 operators presumably will have the benefit

of engine service provided by Rolls-Royce of Canada, an arrangement that will ease transition to maintenance in these over borders.

Major transition inherent in a replacement for the Convair and Martin lines already is evident. One school anticipated some of these aircraft will be introduced in the future, a 50% increasing transport of domestic capacity than the present maximum, based on an aircraft's maximum range and an aircraft with the F-27's characteristics.

So far, other major U.S. aerospace firms have stayed off their plans for twin-turboprop airliners. At one time, Boeing Airplane Co. had a heavy investment in a project similar to the F-27, but this was shifted in the Fokker project because Fokker entered the project. Boeing then put an eager effort into production of aircraft, planned by the F-27 and military testbed projects.

CAA Flight Test Prototype of the F-27 will be flight tested in Amsterdam by CAA and certified by Holland's Civil Air Organization. An American airline company probably will be granted the prototype certificate in 1958.

The F-27 is 56 ft 6 in long and with a wing span of 95 ft. It will have a pressurized cabin and a cabin capacity of 28 to 36 seats. Normal flight weight is given as 32,000 lb. Maximum is 34,420 lb. Normal disposable load varies according to configuration, from 30,041 lb to 31,500 lb.

Maintenance cruising speed at 10,000 ft will be 250 mph. Economic cruising speed of the new altitude at 265 mph. Normal stage distance is 1,900 mi, maximum 3,000 mi.

New Dynauster—Lack of a true replacement for the DC-3 has been a subject of concern to the industry and operators for many years. American manufacturers have followed the market possibilities closely and designs have been on the boards for several years.

In the third quarter of 1954, Malawak's non-mail revenue fell only 1.55

W. W. Lansbury, Jr., Director of Contracts
Chairman, (left), Marceline E. Pyle,
Staple Systems Department Manager (center),
and E. F. Gandy, Director, Computer Systems
Department Manager (right),
monitor relationships between plane
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photo. In makes do's, the author of the market that justified a larger aircraft equipped with double seats for passengers to dominate others.

Even so, with the development of transoceanic engines, there is some strong feeling that both pilots and passengers prefer four-engine aircraft.

A previous series led to sell a DC-1 replacement from Europe was made more than five years ago when Sabre Aircraft Co.'s Semicarroux, two-engine

transports for 24 to 32 passengers and powered by Pratt & Whitney R-1830 Twin Wasp engines, were demonstrated to U.S. buyers. It did not sell.

Local inflators, in various funeral moods, struck to the DC-3. Transair forced the Avenger left Conair and Martin lines with their 40-passenger capacity at much expense.

The Sear is used by Scandinavian Airlines System on European routes. Others are in South America.



All 102 SEATS in North American Airlines' DC-6B were filled on first eastbound leg.

Nonsked Starts Nonstop Service

North American Airlines inaugurated nonstop DC-6B service from Los Angeles-New York last week. First flight-enroute to New York with 93 passengers, including West Coast newsmen, including West Coast newsmen-in-chief in V.H.F. 30 max.

On the return flight, the DC-6B carried a capacity load of 102 passengers. Eastbound flights are overnight, westbound are daylight. The plane is the last of two DC-6Bs the nonstop service has on order from Douglas.

22-Rew. Interline. First flight passengers found that despite the 21 rows of seats, there was sufficient and comfortable leg room in the Douglas aircraft. Builders squating the cabin floor from the cockpit were moved forward, allowing more room in the passenger compartment.

North American's design eliminates a large center and exit seats, giving a clear interior step from the tail of the aircraft to the cockpit bulkhead, with the exception of a small bulkhead. The main cabin seats were designed for the North American coach configuration, with double seats on one side of the aisle and triplets on the other. Some range stations have shown an interest in the 102-seat DC-6B designed by Doug-

Benson Asks Cargo Flights on East Coast

Request for expedited service on cargo aircraft along the East Coast has been filed with Civil Aeronautics Board by Air Cargo, Inc., the Douglas aircraft builders equipping the cabin floor from the cockpit were moved forward, allowing more room in the passenger compartment.

Benson asks the Board to sever the east-west segment of the airfreight network from the east-west to allow as many as 10 flights or, alternately, to grant one or two temporary exemptions to allow service while a decision is being reached.

In his petition, Secretary Benson asks for immediate action so that shippers of perishable agricultural products at various points from Boston to Miami will have all cargo service during the heavy winterization.

NATCC Takes New Noise Abatement Steps

National Air Transport Considering Committee's airport noise abatement program for the New York metropolitan area is being intensified further. The committee's executive director, Van Allen, E. E. Rosenthal, says that more measures should go on a two-way toward alleviating the noise problem:

• Signs at takeoff ends of runways as reminders to pilots of special noise abatement flight procedures.

• Reduction of instruments that register wind information.

• Installation of alternate lights to guide aircraft over unpaved areas on night flights at Newark 11 at LaGuardia Airport.

• First Test-Bureau says the signs at takeoff ends of runways not only will serve as legitimate reminders of special NATCC procedures but will indicate the amount and varieties of radio interference between airport control towers and aircraft that are preparing to take off.

Fox says that these signs will be made at LaGuardia and Newark airports, since special runs like the takeoff of both transoceanic take-off aircraft from paved areas to make their initial climb over open terrain. This applies to runway 15 at LaGuardia and runway 42 at Newark.

• Key Features—On wind information, NATCC's executive director says in some instances instruments are located at height that at times could have remedied volcanic gusts that then actually resulting in the height of aircraft above the runway.

By reducing the measurements, NATCC hopes these will be noise velocity readings of 15 mph or less, with proportionate gain in time at given aircraft speeds.

The chairman notes that wind velocity is a key factor in the performance rating system installed by NATCC to permit as many landings and takeoffs as possible, consistent with safety, on those airports. Landing aircraft over water and unpaved areas.

Because of the safety considerations, this system is limited to times when winds are at 15 mph or less (velocity of 15 mph is equivalent to about 80 degrees from the runway heading).

• Plan Cargos—Regarding the use of selector lights, Rosenthal says he recently consulted with Flushing Meadows, New York City. Reports from a preliminary test recently survey show the light helped guide a sequence of planes over the open area of Flushing Meadows Park, providing adequate visual signals.

The light was installed after unanimous flight test by NATCC technical

committee had indicated that it was difficult to fly directly over the meadow at night, due partly to ravine between light in darkness.

The experimental reference light test will continue as an interim period, according to Rosenthal. "We have obtained experience with it in a wide variety of weather conditions."

He said NATCC hopes to determine if the light will be adequate and suitable further installation.

CAB to Let Test Pilots Certify New Aircraft

Civil Aeronautics Administration will designate flight test pilot representatives from private industry as CAB safety representatives to speed certification of new aircraft and approval of modified types.

Advantages of the new type safety agent, CAB says, are:

- Faster service to the industry industry
- Federal agents are kept to a minimum
- Aviation industry is encouraged to take increased responsibility for flying safely.

CAB Settles Ocean Mail Rate Cases

Civil Aeronautics Board has decided the eight-day-old trans-Pacific mail and news case, airmail post and letter rate for Trans World Airlines, Pan American World Airways and the two domestic American Overseas Airlines.

Mail rates set for the carriers:

• Trans World Airlines, for the period Feb. 5, 1954, to Dec. 31, 1954, \$31,250.00 for airmail post and letters, a decrease of \$365,300 from previous record trans-Pacific rate orders.

• Pan American World Airlines, for the period Jan. 1, 1946, to Dec. 31, 1953, gets \$35,600.00 for Atlantic Division operations an increase of \$51,000 over amounts received under temporary rate orders.

• American Overseas Airlines, for the period Jan. 1, 1946, to Sept. 25, 1950, gets \$22,100,000, an increase of \$8,791,000 over amounts received under temporary rate orders.

• Trans World Airlines, for the period beginning Jan. 1, 1954, gets \$4,351,000 for its additional trans-Pacific operations.

• Pan American World Airways, for the period beginning Jan. 1, 1954, gets \$9,151,000 a year for its Atlantic Division operations.

The mail per pound for American and TWA has flat and future periods in subject to an adjustment which can develop from a Board investigation to see whether bills from either carrier are available for either agency.

Trans Atlantic operations in line with the Supreme Court's Chicago & St. Louis decision.

► Encouraging Visual-landfall mail may extend TWA and TWA for future operations unless otherwise in the manner's initial decision. Rate of compensation for both airlines is the same in route where they have comparable equipment.

The Board task an ongoing type of TWA's trans-Pacific route 1952 and found the possibility that the carrier's Atlantic operations will not exceed subsidy assistance in 1954. CAB also found it substantially all subsidy paid is shifted to certificate carriers, as currently planned, thus it a "teleological" possibility that TWA's trans-Pacific operations will be on reduced subsidy base.

► Reduced Rates.—In a separate action, CAB has set temporary ocean mail rates for the trans-Pacific services of Pan Am and TWA and the trans-Pacific services of Pan Am and Northwest.

These rates were suspended last April for service and regular trans-Pacific air mail rates of 67 cents a ton-mile in the Pacific. The Board decided these were too high in view of decreasing cost trends and an increase in the volume of maritime mail being carried.

New temporary rate for the Pacific air mail for the period April 1, 1954, to Dec. 31, 1954, is 30 cents a ton-mile. After Jan. 1, 1955, the rate will be 35 cents. New temporary rate for the Pacific air mail for April 1, 1954, to Dec. 31, 1954, is 50 cents a ton-mile. After Jan. 1, the rate will be 55 cents.

ATA Elects Board, Approves '55 Budget

At Transportation, the elected director decided to move on the ATA board and approved a budget for 1955.

New board members are Charles E. Bond, Board Attorney; G. T. Baker, National Airlines; Donald W. Nixey, Northwest Airlines, and C. A. Myrick, Eastern Airlines.

Re-elected to the board W. A. Patterson, United Air Lines; C. R. Smith, American Airlines; J. T. Tripp, Pan American World Airways; Leslie M. Bratt, All-American Oil; L. L. Lewis, and W. L. Frazee, Trans World Airlines.

Wally Phillips, director of public relations, was elected a vice president.

► Public Relations Program.—The board approved an undesignated sum for the budget for the first half of 1955. The budget for the first six months of 1954 was \$595,000.

An industry public relations program was approved, as was a full-time representative for the ATA international and

facilities management. The board also passed a resolution approving an Army program for airline operation of military helicopter types as an experimental basis.

► Local Panel Prize.—At a meeting of the 14 member panelists, the Conference of Local Airlines elected three new officers: Hal N. Cole, North Central Airlines; Robert Peck, Midwest Airlines; and Eddie C. Johnson, Southwest Airlines. Conference of Directors are T. D. Davis, Pan American Airlines; Eddie Head, Delta Air Lines; and Nick Iker, West Coast Airlines.

CAB ORDERS

(Dec. 9 '54)

GRANTED

Sullivan Airlines' application for renewal of its exemption to perform air service in the Americas will end after a decision on the petition of Pan American World Airways for an injunction against Sullivan Airlines. The injunction was granted by U.S. District Judge John H. Munro of San Francisco, who ruled that the carrier's failure to observe a mandatory leave to preserve the California City-Los Angeles round trip.

Transair's application to operate an oceanic cargo airline from Atlanta to San Juan via Miami, Cuba, from Dec. 14, 1954.

Flying Tiger Line's application to open air cargo flights from Miami, Cuba, to New York on or about Dec. 16, 1954.

North Central Airlines' application to issue International Filing Slips on a one-month basis until Sept. 30, 1955.

APPROVED

Intercarrier agreements involving Trans World Airlines and United Air Lines and various other carriers.

Certain agreements previously for the lease and purchase by Alaska Coastal Airlines of aircraft were terminated.

► Pan American World Airways' application to issue International Filing Slips on a one-month basis until Sept. 30, 1955.

EXCLUDED

Delta Air Lines' authority to no mail service irrespective of destination, for one year.

DENIED

Trans World Airlines' application to suspend service temporarily at Memphis.

DEFERRED

Los Angeles Airlines to this plane who said rates determined by CAB should not go up more than 10 percent.

Alaska Airlines' last mail rate may be reopened to determine a new rate or take other appropriate steps.

Northern Consolidated Airlines had rate review for its proposed for the purpose of determining a new rate or taking other appropriate steps.



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AVIATION CALENDAR

- Jan. 19-21—Helicopter Association of America, 10th annual meeting, Warwick Hotel, Philadelphia.
 Jan. 19-21—Society of Automotive Engineers, annual meeting and engineering display, Statler-Cadillac and Hotel Statler, Los Angeles.
 Jan. 19-23—Wings International Airshow, Miami (Hib) International Airport.
 Jan. 20-21—Institute of Radio Engineers and Radio-Electronics Television Mfg. Engineers Assn. Symposium on Printed Circuits, University of Pennsylvania, Philadelphia.
 Jan. 20-21—Conference on High-Speed Aerodynamics, organized by the Department of Aeronautical Engineering of the Polytechnic Institute of Brooklyn, Long Island City, New York.
 Jan. 24-27—American Marketing Association, 13th annual meeting, New York.
 Jan. 24-27—Flight Maintenance & Engineering Show, and three-day conference, Belmont Park, Long Beach, California.
 Jan. 24-27—Society of the Broadcasters, 21st annual meeting, Union Square Hotel Annex, New York.
 Jan. 27-28—Southern California Motor Van, fourth annual Industrial Show, Civic Auditorium, Los Angeles Hotel Junior Civic Club, Los Angeles, Calif.
 Jan. 27-28—American Institute of Electrical Engineers winter annual meeting, Hotel Statler, New York.
 Feb. 8-10—Society for Plastics Industry, 19th Annual Plastics Division Conference, Hotel Statler, Los Angeles.
 Feb. 10-11—Society of American Military Engineers, 10th annual meeting, Cleveland, Ohio.
 Feb. 20-23—French annual Trade Agricultural and Animal Conference, Adm' College of Texas, College Station, Tex.
 Mar. 1-12—National Air Transport Association, National Flight Training Meeting, Americana Hotel-Civic Center, Cleveland.
 Mar. 14-16—Society of Automotive Engineers, gathering members and guests, National Plaza, Cincinnati.
 Mar. 14-17—American Society of Test Engineers, 1971 Annual Meeting, Shrine Auditorium, Exposition Hall, Los Angeles.
 Mar. 18-24—Society of Radio Engineers, national conference, Wilshire Americas Hotel, New York.
 Mar. 25-April 1—Aerospace Industries Association and Western Metal Exposition and Congress, to include the American Welding Society's technical session on aircraft and nuclear. Pan Pacific Auditorium and Statler Hotel, Los Angeles.
 Mar. 26-28—Society of Automotive Engineers, Aerodynamics Seminar, Research Laboratory, Aerodynamics Section, National Physical Laboratory, Teddington, Middlesex, England.
 Apr. 6-10—World Pictures Fair & Trade Exposition, National Guard Armory, Los Angeles.
 Apr. 18-21—Society of Automotive Engineers, Golden Anniversary Seminar Meeting, Aerospace Production Forces and Aircraft Engineers Display, Hotel Statler and McWayne Hotel, New York.
 Apr. 18-21—American Rocket Society spring meeting, Statler Hotel, New York.
 Apr. 24-25—Aeropac Oceanus Council, 1955 convention, Olympia Hotel, Seattle.

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EDITORIAL

Time for a Nonsked Decision

Now comes a well-known perennial named, a "large irregular carrier," with the first of two new 102-passenger Douglas DC-6Bs, operating the first daily transcontinental nighting coach service in history. West Coast flights rule the sky.

Frost makes the same as the company's DC-4s \$10 one way, plus tax. Scheduled carriers, offering coast-to-coast coach service in both directions with at least one stop, charge \$99, plus tax, with no special roundtrip rate. This carrier offers a roundtrip for \$160, plus tax, good Mondays through Thursdays.

This operates thus because the first "unscheduled" carrier is able, with low initial cost, a transcontinental coach service faster than that of any scheduled airline.

Like most problems that are allowed to drag, the importance of whether to certificate unscheduled carriers has been growing exponentially as Civil Aeronautics Board has permitted it to drift.

The carrier's new service, with aircraft that cost over a million dollars apiece, suddenly dominates upon the rising importance of irregular carriers and the importance of defining their role and regulating them.

Starting coast-to-coast flights in new DC-6Bs can hardly be called that-day service. There is no longer any possible excuse for Board inaction in the conception that the carriers often greatly abuse accommodations to those of regular carriers.

The Board has vacillated over the years in an erratic, shrillbarking series of threats, rejections, new regulations, deferrals and varying interpretations of delta laws. But if it has never known or made up its mind on the subject, Sen. Pat McCarran, co-author of the Civil Aeronautics Act, said, "By trying to write a definition of an irregular carrier they [CAB] have made it difficult for a conscientious operator, who honestly seeks to run an irregular service, to know whether he is operating within the law or not. In the same way, they have opened up an avenue for evasion of the law, of which great advantage has been taken."

The Board's enforcement case against that particular line is in hands of an examiner, but Board people doubt if a decision can be reached in less than two to five months. It has stalled on the company's certification case for many months.

Both the commercial industry and the Board acutely underestimated the potentialities of the low-priced aircoach market when the body nonetheless set up rules with war-vintage DC-3s and so shortly after World War II ended. But the business grew constantly, despite a high bankruptcy rate among the unscheduled or irregular carriers. There are few common-carrier terminals left—most of them are charter operators—but the remaining group is the strongest of the lot.

By the time the Board wished to throttle the non-skeds, it found that a well developed public opinion—including some support on Capitol Hill—seemed to make almost action politically disastrous, so it still refused to touch the non-sked ball by the horns.

The scheduled industry probably could have elimi-

nated that pesky common-carrier competition by 1953 by bracketing the scheduled schedules, reducing fares a second time, from the \$75 coast-to-coast site where it is now, down to \$75 or \$80. CAB probably would have welcomed such fare petition for second- or third-class service. But the industry didn't go all out, either, and nevertheless the large irregulars have grown.

The largest line alone reports to CAB that it handled 147,290 revenue passengers in the first nine months of 1954, and Board officials guess that the fourth quarter will show as many as 65,000 to 70,000.

A few days ago, CAB announced that all irregular carriers will be able about 60,000 passengers this year for a total of 1.3 billion passenger miles. This includes military and civilian charter business, as well as common-carrier traffic.

There appear to be three general directions CAB could take: (1) it could permit the present rules and uncertainty to continue, which is obviously unsatisfactory to both regular and irregular carriers alike; (2) it could accept—unofficially, we believe—to put most or many of the irregular carriers out of business; or (3) it could aver that there is a niche for the irregulars, define it, and put those who meet the requirements into proper regulation. End the exceptions!

Last April 19 on this page, *Airways Week* urged officially that the government's Air Coordinating Council issue in its then forthcoming recommendations on the new Administration's air policy "decisive sense of the conclusion and conclude a firm stand for issuance and encouragement of the country's irregular operations without suspending the financial foundation of any other segment of the commercial airline industry."

The report that came out later did, in fact, state that "some operation of large irregular carriers, such as long distance charters and contract operations, can and do provide services which are supplemental to those authorized by regular route certificates." There appear to be a wise rule when the irregular carriers can fill in the specified niches. It is appropriate for the government to encourage the development of this specialized market.

The report recommended what "basically new type of certification" for large irregular carriers. It also said "in the future" there should be no general use of the existing route authority as a basis for authorizing "common-carrier transportation to individually ticketed passenger on large transport planes."

President Eisenhower accepted the report May 26, and said it "reflects this Administration's control objective in this field—to strengthen American aviation." CAB, however, did not participate in preparation of the action on the report dealing with unscheduled operations. "Because of short applicability in case we believe it."

Nor has CAB taken any prompt or decisive action on the general subject since the President's Air Coordinating Committee report was accepted by the White House six months ago.

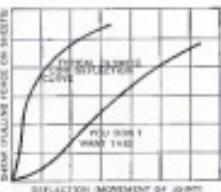
—Robert H. Wood

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